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Including the Railroad Gazette and the Railway Age

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GENERAL NEWS SECTION..... 259

AS announced in our news section last week, the railways entering Kansas City have agreed to abolish their individual uptown ticket offices when the new union station is opened and establish one joint city ticket office. That is, there will be one joint ticket office at the station and one joint ticket office uptown. Statistics collected some time ago, and published in the *Railway Age Gazette* of December 22, 1911, page 1263, showed that the rentals for city ticket offices of eleven roads in Kansas City aggregated \$3,110 a month and that the clerk hire for them amounted to \$3,176 a month, a total of \$75,432 a year. It is probable that by substituting a joint office for individual offices a saving of at least 50 per cent, or, say, \$37,500 a year, can be made. While this economy is being effected, the service given to the public will be improved. At present in Kansas City, as in most other cities, the various

ticket offices are scattered about the business district. If a traveler fails to get at one of them transportation via the railway he wants to go over he is put to the inconvenience of having to go out and find the ticket office of some other road. At a joint ticket office he is certain to be able, without leaving the room, to get the transportation he wants by one line or another. It is to be hoped that the change decided on at Kansas City will be the forerunner of the introduction of a similar reform at other cities. Much larger economies could be made at several other places than at Kansas City. Up to a short time ago the rentals for city ticket offices at St. Louis amounted to \$12,458 a month and the salaries of those employed in them to \$6,715 a month, a total per year of \$230,076. The rentals for the ticket offices of thirteen railways in Chicago aggregate \$141,500 a year, and their payroll amounts to \$155,700 a year, or a total of \$297,200. Probably the rentals and salaries of all the ticket offices in Chicago aggregate \$550,000. In the entire country the waste involved in the duplication of ticket office service must be very large; and in a great majority of cases it is a waste that could be prevented with advantage to the railways as a whole and without injury to any individual line.

TO give passengers at a station all desirable information about trains is impossible, except by word of mouth; and at large stations the information bureau is at present a necessity. Complete printed notices, in sufficiently large type, would be out of the question. Poster time tables, 3 or 4 ft. square, are unsatisfactory because, at their biggest, they still can be read only by patient persons who take the time to get near them, and by such persons only in good light. The problem being difficult, it has to be settled by a compromise, and we illustrate in this issue a scheme in use at Glasgow, Scotland, which embodies one of the most satisfactory compromises that we have seen. The distinctive features of this collection of bulletins are its position and its size. There is room enough for everything essential, and plenty to spare. The ordinary placards are readable at a long distance; and considerably smaller lettering, small enough to put one or two hundred words in a window, is readable 30 ft. away, thus providing for emergencies. Posting these notices at the side of the crowd, instead of in front of it, is a happy idea, and a thing that we do not recall having seen elsewhere. The thought occurs to one that to post the bulletins in order of time instead of in the order of the numbers of the platforms would simplify the scheme for the passenger unfamiliar with the station. With such an arrangement it would be possible always to show all of the trains for, say, 30 or 60 minutes ahead; and the platform numbers, movable, could be inserted even at the last minute, if the trains were not ready earlier. A blank space would indicate that the cars had not been placed. Possibly this arrangement would necessitate making all the placards so that they would slide laterally, and thus always keep the earliest train at the left, and the latest at the right, but that would not be difficult. This principle is embodied in a bulletin at Euston station in London (London & North Western) which, however, is a very much smaller affair. The Euston bulletin is an endless curtain, perhaps 2 ft. wide, carried on two horizontal rollers, one about a yard above the other. It shows the leaving time of all trains. The part of it which is visible shows the next half dozen or so trains. As the train departs the curtain is rolled off the lower roller and on the upper one. The merits of this and of the Glasgow idea could be combined with advantage.

THE Lake Shore & Michigan Southern was the first road in this country to place superheaters on switch engines. When it was first proposed by the general manager, D. C. Moon, early in 1911, it met with considerable criticism. It was argued that locomotives of this class did not burn much coal and that the demands on them were so irregular that any

saving which might result would not be great enough to warrant the expense of installing the superheater. Mr. Moon's desire was not so much to reduce the fuel consumption as to lessen the amount of smoke and cylinder condensation. The greater part of the objectionable smoke in the vicinity of large cities is caused by switch engines, and water in the cylinder is particularly objectionable near stations, where it is often thrown out of the stack, ruining the clothes of by-standers. The experiment was tried out on two of the standard Lake Shore switchers, which were equipped with superheaters of the Schmidt type, one of them being used for service about the Union station at Cleveland, and the other at the LaSalle street station, Chicago. After they had been in service for a short time a canvass of the engine crews indicated that only about one-half as much coal and water was required as before, and accurate tests which were made later indicated a saving of 40 per cent. in both the fuel and water. This was accompanied by an almost complete elimination of black smoke and cylinder condensation. As a result of these tests 20 heavy switch engines were ordered for use on another one of the lines of the same system and their service is said to be equally as satisfactory as the two experimental engines on the Lake Shore. D. R. MacBain, superintendent of motive power of the Lake Shore, has summed up the advantages of the use of superheaters on switch engines as follows: Engines equipped with superheaters do much better work than saturated steam engines of the same size. The percentage of saving in fuel due to the superheater is much greater on switch engines than on locomotives used in road service and the consumption of water is correspondingly reduced. There is a reduction of at least 50 per cent. in the delays due to taking water and coal, and an almost complete absence of black smoke when care is taken to fire properly. There is practically no condensation in the cylinders and it is, therefore, not necessary to open the cylinder cocks; moreover, there is no possibility of dirty water being ejected from the smokestack and ruining the clothes of passers-by. Where it was formerly necessary to clean the fires every 12 hours they can now run 24 hours and still be in good shape. Flue leakage, common to this type of power when using saturated steam, has almost entirely disappeared, and it is reasonable to expect that the general boiler upkeep will be reduced in proportion to the saving in fuel and water.

PREPARE TO PREVENT A "CAR SHORTAGE."

WE publish in our news columns this week an open letter to industrial traffic managers and commercial organizations in the West, which is being sent out by W. A. Garrett, chairman of the Western Association of Railroads, giving warning that it is probable there will be a severe car shortage this fall unless shippers and consignees co-operate with the railway managers to avert it. Mr. Garrett shows that on July 18, 1912, the net surplus of freight cars in the United States was but 68,922. This is the time of year when the available car supply always begins rapidly to melt away. The reduction in the net available supply in the three months from July to October was varied in the last four years from 128,540 cars to 248,766 cars. In other words, past experience foreshadows a net shortage on or about October 25, 1912, of from 60,000 to 190,000 cars.

Mr. Garrett and the railways he represents have acted wisely in sharply calling the attention of the shipping public to the facts. The railway managers repeatedly during recent years have given warning that the policy of public regulation being followed would incapacitate the carriers to provide sufficient facilities to handle satisfactorily the country's growing commerce. Their warnings have gone unheeded. As we pointed out in an editorial last week, the result of general business conditions, of public regulation and of the increases in the wages of labor, has been a reduction in net earnings in 1912 as compared with 1911, and a reduction in 1911 as compared

with 1910. While 1910 was a good year, both 1909 and 1908 were bad years. The effect on the car supply of the various forces that have been at work are reflected in the following figures of the Interstate Commerce Commission showing the total number of freight cars in service on the dates mentioned:

June 30, 1907.....	1,991,557
June 30, 1908.....	2,231,181
June 30, 1909.....	2,218,280
June 30, 1910.....	2,290,331
June 30, 1911.....	2,195,511

There was an increase in the total number of freight cars in every year from 1897 to and including 1908. The increase in 1908 over 1907 was due to large orders that were placed in 1907 before the panic. There was a decrease in 1909, an increase in 1910, and another decrease in 1911, with the result that in 1911 there were fewer freight cars in the country than in any other year since 1907. Large orders for equipment were placed late in the calendar year 1911, and in the early part of 1912. Furthermore, there has been a steady increase in average capacity. On the other hand, it is to be feared that when the pinch comes it will be found that many cars that have been reported available are unfit for service, because they have not been adequately maintained. On the whole, therefore, it is doubtful if there has been any increase in actual car capacity since 1910, and it is a safe conclusion that car capacity has not kept pace with the demands that will be made on it within the next few months when the bountiful crops now in prospect begin to move.

If a car shortage does come it is impossible to see how any reasonable person can lay the responsibility for it at the door of the railway managers. With earnings and operating expenses tending the way they have been in recent years, the managers probably have dealt as well as they could with a bad situation. Even though shippers and public authorities refuse to accept this view, it will do no good now for them to agitate and legislate about the car supply. The only way that now remains to prevent a car shortage is for all parties concerned to co-operate as well as they can to make the best use possible of the available equipment. Three means by which shippers and consignees can co-operate with the railways are suggested by Mr. Garrett. (1) They can move within the next few weeks, while there will be a surplus of cars, all of the freight that can be moved during this period. There is an immense tonnage of coal, lumber, etc., which can be shipped in August, September and the early part of October, just as well as later. If this tonnage is got out of the way it will be much easier later to handle the crop movement. (2) Shippers and consignees can help by loading and unloading cars as expeditiously as practicable. (3) They can also help by loading all cars as near to their capacity as practicable.

"Car shortages," so-called are usually more due to misuse of equipment than to lack of it. During about two-thirds of the year the railways have standing on their sidetracks upwards of 100,000 cars, for which there is no demand. Roughly speaking, every freight car represents an investment of \$1,000; this is a conservative estimate. On this basis 100,000 to 150,000 idle cars represent an idle investment of \$100,000,000 to \$150,000,000. The railways have to pay a return on that investment. To pay it, they have to earn it. To earn it, they have to charge the shippers rates to cover the equipment that is used throughout the year as well as that which is used only part of the year. Isn't there enough economic waste in having an investment of \$100,000,000 to \$150,000,000 earning no money for six or eight months out of the year, without so increasing the car supply that there will be two or three hundred thousand cars, representing an investment of \$200,000,000 or \$300,000,000, idle for six or eight months in the year? The best way in which this larger waste, due to having a yet larger number of cars standing idle on sidetracks a large part of the year, can be prevented is by making the best practicable use of a

smaller car supply during the periods of heavy traffic movement. Therefore, when the railways call on shippers and consignees to make the best practicable use of the car supply when it is all in use, in order to make it unnecessary to increase the supply of which nobody makes any use during most of the year, they are simply calling on them to do what it is to the interest of the shippers and consignees to do, and what it is to the interest of the public to have them do.

THE STANLEY COMMITTEE RECOMMENDATIONS.

THE Stanley committee which has been investigating the United States Steel Corporation, having finished its work, has split on the rock of difference of opinion and made five reports regarding the policy that should be adopted by the Federal government in dealing with industrial combinations. The members agree on only one thing. This is that there ought to be additional legislation. In this they are true representatives of public opinion. Everybody agrees that something more ought to be done about agreements and combinations between industrial concerns, as well as about agreements regarding rates and service between competing railways, but hardly any two agree as to just what ought to be done. Past experience with legislation dealing with new and complicated conditions suggests the desirability of applying to the situation only policies which already have shown their remedial character when applied to other similar situations.

One policy that has been tried in the regulation of railways, and to a greater or less extent in the regulation of other concerns, with good results, and which is recommended by all of the committeemen, is that of securing accurately the facts about their affairs and giving them full publicity. Among the facts concerning industrial combinations as to which full publicity is desirable is the exact nature and effect of their contracts and agreements for control of output, division of territory, maintenance of prices, etc. Such arrangements are much more likely to be reasonable if reasonable agreements and contracts are legalized and publicity for all of them is required than if all are made illegal and no publicity is required. Under the Sherman law thus far we have what up to a short time ago was understood to be prohibition of all agreements and publicity for none. The consequence has been the making of many arrangements, a large share of which have been unreasonable.

The creation of an "Interstate Commission of Industry" to supervise industrial corporations is among the recommendations of the minority. If such a commission were established, one of its principal duties should be to determine whether trade agreements were or were not reasonable. It would seem that the proper test would be, not whether they tended to interfere with competition, but whether they tended to stifle it. The unfair and excessive competition which tends to exhaust and destroy all of the competitors except the very strongest is undesirable, if for no other reason than that it tends to develop the very condition of monopoly which it is the main purpose of legislation to prevent. Of course, agreements and combinations found to be unreasonable should be prohibited or destroyed. One proposal made is that the burden of proving that an agreement or combination is reasonable should be transferred to those making or seeking to make it. This does not seem fair, for there is a moral presumption, and ought to be a legal presumption, in favor of the uprightness and reasonableness of men's intentions and acts, whether in respect to small business affairs or to large ones. No one could tell what the effect of such a radical departure from past legislation and judicial precedents would be until cases had been tried under the proposed provision.

The minority of the committee makes a gingerly recommendation for giving the proposed Interstate Commission of Industry authority to regulate prices. In view of the fact that such legislation would border on the revolutionary, and that those favoring it found that the average wholesale price of

steel products has declined since the Steel Corporation was organized, the argument for government price-making does not seem strong.

One of the main recommendations of the majority is legislation clearly to prohibit industrial corporations from owning stock in railways or shipping their own goods over any common carrier in which they own stock. The language used is such as to imply that if goods moved partly by rail and partly by boat ownership by the same concern of both the goods and the boat would also be forbidden. There is no question that railways have at times so used their control of industrial properties—mines, for example—as to work unfair discriminations against independent industrial concerns. There is equally little question that industrial corporations have used, and do now use, their influence over or control of railways, large and small, to secure improper and unduly discriminatory concessions in respect to railway rates and service. It is somewhat doubtful, however, if by the complete destruction of the corporate relationship between railways and industries the object sought—viz., the elimination of these discriminations—would be attained, for such legislation would not prevent the same men from being, as stockholders, dominant in both industrials and railways.

Another bill recommended by the majority is designed to break up what are regarded as the too close relations between railway corporations and some of the large corporations, such as the Steel Corporation, from which they make purchases. It prohibits any person who is engaged as an individual, or as a member of a partnership, or a director or other officer, or an employee of a corporation, in the business in whole or in part of manufacturing or selling railway cars or locomotives or rails or structural steel, or mining and selling coal, from acting as a director or other officer or employee of any railway company which conducts interstate commerce business. This measure, like the one in reference to the ownership of stock in railways by industrial corporations, would not necessarily accomplish its object. It would not prevent the same men from owning large and, perhaps, controlling parts of the stock of railway equipment concerns and the railways to which they sell, and it would not prohibit railway officers from owning stock in supply concerns.

The *Railway Age Gazette* is unable to feel unsympathetically toward legislation intended to remove railway managements from the influence of those controlling or directing the management of large industrial concerns. Even when, as has in many cases been true, those who have been officers of or directors in large industrial corporations and also directors in railways have never in any way used their railway directorates improperly, the effects of their dual connection often have been harmful. There is a natural tendency on the part of railway officers to do what they think may please the directors, and this in itself may cause improper favors to be given to an industrial corporation in which a director in the railway is largely interested. Again, railway directors ought to intelligently supervise railway management, and many of them who are also largely interested in and directors of large industrial corporations do not properly perform their railway duties. One of the worst faults of railway management in the United States is that many of the directors in numerous railways live in the East, never go out over the lines, know nothing by personal observation of the condition of the properties, the needs of the territory that they serve or the state of public opinion, and yet, thus ignorant, presume to guide and control the acts and policies of the executive officers. If legislation such as that proposed would have the effect of causing more men to be put on railway boards who would take their duties as directors seriously and perform them assiduously and earnestly, it would be a good thing; and it might not be a bad thing as to some of its other effects.

But, after all, the evil, so far as it exists, of the intimate

financial and official relationship between some railways and industrial corporations, whether the latter sell railway equipment and supplies or merely buy transportation, does not consist so much in the existence of the relationship as in the use, or misuse, made of it. The application of complete publicity and of some measure of administrative control to large industrial concerns might be wholesomely effective without the prohibition of stock ownership and interlocking directorates; and without full publicity and adequate control of large industrial corporations, such abuses as exist under present conditions will not be rooted up. Perhaps the ideal condition would be one under which the railways and industrial concerns would be completely divorced from each other, both as to the personnel of their officers and their financial control, and would always deal with each other in the purchase and sale of both transportation and railway supplies and equipment on equal terms and at arm's length. But it is very doubtful if any legislation can, alone, produce this condition. The development and exercise of a finer sense of honor and a higher sense of public duty among the large financial interests of the country would bring about a much closer approximation to it than any legislation.

NEW BOOKS.

The Effect of Cold Weather on Train Resistance and Tonnage Rating. By Edward C. Schmidt and F. W. Marquis. 24 pages, 13 illustrations. 6 in. x 9 in. Bound in paper. Published by the Engineering Experiment Station, University of Illinois, Urbana, Ill. Bulletin No. 59. Sent free on request.

This bulletin presents the results of tests which were made to determine the increase in resistance of freight trains in cold weather over that which prevails in summer. It shows how great this difference may be in some cases. The tests also show that freight trains must run a considerable distance from their starting point before the minimum resistance is reached. In cold weather this distance may be as much as twelve or fifteen miles. The bulletin presents, in addition, a summary of the practice of American railways in reducing tonnage ratings during cold weather.

Manual of the Railway Signal Association. Published by the association, Bethlehem, Pa. 600 pages; 8 in. x 9½ in.; cloth. Price \$4.

This thick book contains all of the findings, conclusions, standards and specifications which have been adopted by the Railway Signal Association, thus constituting a handbook of recommended practice. The different subjects are arranged alphabetically and the five or six hundred pages are fastened in a loose leaf binder so that new matter can be inserted at any time. The page is 6 in. x 9 in., but the binder which is very strong and substantial, occupies a space about 8 in. x 9½ in., and has a capacity of, perhaps, 1,000 pages.

This is an invaluable compilation for signal engineers, and all who have to do with railway signal departments. It was made by a committee of three members, consisting of W. J. Eck, H. S. Ballie and C. C. Rosenberg. The largest single chapter in the book is that devoted to drawings. These include standard designs of semaphore posts and blades; pipe carriers, cranks, jaws, etc.; compensators, foundations, ladders, lamps, trunking, and many other details. The other principal subjects are: automatic block signals (specifications for contract) 30 pages; automatic block signals, alternating current, 31 pages; batteries; electric circuits (54 pages); channel pins, concrete and copper sulphate; definitions of technical terms (15 definitions); electrical interlocking (specifications for contract); electro-pneumatic interlocking; mechanical interlocking; iron castings, wrought iron bars, illuminating oil, asphaltum, steel pipe and wrought iron pipe; relays, roundels, signal motors, switchboards, symbols for use in drawings, and wire. This last subject fills 50 pages and includes specifications for different kinds and sizes of insulated and uninsulated wire.

Letters to the Editor.

A SUPERINTENDENT ON "THE LESSON OF THREE COLLISIONS."

CHICAGO, August 1, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

I am writing in reference to the editorial, "The Lesson of Three Collisions," in your issue of July 26. In my opinion this is a forceful editorial, and essentially correct. You have stated what I believe to be the true cause of a number of the most serious accidents of the past few years. As a superintendent, I must plead guilty to the indictment. While I have repeatedly tried to impress on trainmen the necessity for cautious running and careful protection, especially under conditions requiring caution, and have never knowingly taken to task an engineman for not making time under these conditions regardless of the amount of time lost, it is a fact that we have only occasionally imposed discipline for fast running when investigation probably would have shown conditions to be unsafe for the speed actually made. The same is true of my trainmaster.

There is another phase of this question, however, which was not given due prominence in your editorial. When you get right down to brass tacks, the superintendent is the man who bears the main burden of responsibility. He and his trainmasters stand almost if not quite alone in the fight to remove "the cause of the causes" of accidents to which you refer. Do not forget that he is surrounded by influences which largely defeat his efforts and will continue to do so until there is a general education of the public to the real conditions and real responsibilities in the matter.

First, you have the man who, backed as he knows by the strength of his brotherhood, becomes slack and acquires slovenly habits of mind instead of being wide-awake, alert and alive to his responsibilities while on the road.

Second, you must not overlook the high salaried general chairman of the brotherhood grievance committee who ought to stand behind the superintendent and assist him in his efforts to secure safe operation, by discipline if necessary, but who does not. On the contrary, he is paid for and spends nearly all of his time in relieving men of discipline, practically without regard to the cause of the discipline. He frequently goes to the general superintendent or general manager and indicates that certain superintendents and certain trainmasters are not fair to their men and impose discipline when the men are not at fault.

Third, we have the general superintendent or general manager who (perhaps naturally) seeing the shadow of the great power of the brotherhood behind the general chairman, listens to his story and not infrequently forms an opinion that this or that superintendent is unpopular with his men. I do not mean to say that the superintendent is always right, but I do mean to say that his efforts toward securing safe operation are largely defeated by the labor organizations which by the efforts of the general chairmen are frequently able to have good discipline nullified. I also mean to say that the general chairmen frequently intimate or openly say that they will take cases in dispute higher and have the superintendent's decision reversed when the decision of the superintendent is absolutely proper. Also, it may be added that they are usually successful when this is done. The large number of cases carried over the superintendent's head is sufficient proof of the fact that the activity of general chairmen and the influence of the brotherhoods are very important factors working against safe operation.

Fourth, we have the public, always ready to criticize and rarely to commend, in whose eye the conductor is a semi-hero and the engineer a real, dyed-in-the-wool hero, who "sticks to

his post." As a general proposition, I believe it may be safely said, the public stands behind the man or the labor organization and against the railway corporation in the case of controversy or accident.

All of these are unhealthy conditions, and we will continue to have accidents as long as they exist. Automatic block signals and automatic stops will not stop them. It is my humble opinion that they will not cease to exist until the public becomes sufficiently educated to forget all the sentimental twaddle about the engineman or the conductor being a hero, and begins to look on them in a natural way as plain, ordinary men who have plain, simple duties to perform and no excuse for not performing them. Further, the public must get in behind the superintendent and back him up in his efforts to secure safety. The other things will then take care of themselves.

If I have written in plain language it is also because I am interested. All the hand signals, block signal systems, cab signals, automatic stops, safety trips or other devices you could place on the railway right-of-way will not accomplish a fraction of one per cent. of what public education and opinion may do to remove "the cause of causes."

SUPERINTENDENT.

FALLACIES IN THE INTERSTATE COMMISSION'S OPINIONS.

CHICAGO, August 1, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

In the opinion of the Interstate Commerce Commission in the matter of express rates, Docket No. 4198, Page 401, the following statement is made:

"... It is contended by the shippers, with much show of reason, that if it is profitable for the express companies to carry some classes of merchandise at the rates named in Sections A, D, and E, which are very much lower than the merchandise rates, that higher rates than these are unreasonable and this commission is likewise justified in holding that such lower rate is reasonable, or, at least, not unreasonably low because it is the voluntary rate of the carriers'..."

The latter portion of this paragraph is quoted from some source not stated, but apparently with some approval by the commission.

In the opinion of railway men the above contains two serious fallacies. It may be true that the reasons given by the express companies for making lower rates on certain articles than on others are inadequate, and that their practices in that respect should be corrected, but the fact that a common carrier finds it necessary to transact a portion of its business at low rates is no evidence in itself that higher rates carried on other portions of its business are therefore unreasonable. It has often been shown that concerns in all lines of business carry on their transactions with varying profits. The averaging of profits is necessary in practically all classes of business, that of the common carrier no less than others. It goes without saying that the discriminations of the carrier must have a reasonable basis and must not be undue, but that is a different point, and it remains true that the mere fact that low rates are necessary in one case never proves that any rate which is higher is unreasonable.

The second fallacy is contained in the last three lines which the commission quotes from someone else, viz., "that whenever a rate is voluntarily established by the carrier, the commission would be justified in holding that it is a reasonable rate, or, at least, not unreasonably low." What are we to suppose is meant by the word "voluntarily" as used in this connection? It is probable that a carrier or any other business concern, if it might follow its own wishes, would do all its business at one rate and save itself the complications which follow these classifications. As a matter of fact, we know business cannot be done that way, because circum-

stances force the acceptance of lower profits in some cases than in others. The rates made to meet these conditions are not voluntarily made except in the sense that they are made without an order from public authority. Railway tariffs throughout the country are full of rates which were not ordered by any commission and which still are unreasonably low because they return a profit over the "out of pocket" cost of conducting the particular transaction only and do not yield a return on the investment including fixed charges, maintenance, administration, etc. Any rate of that kind, it would seem, should be properly classed as unreasonably low, because it fails to yield a return on the capital invested. Therefore, it is lower than reasonable, although perhaps not lower than necessary in view of the conditions under which it is made.

It is these fallacious arguments which we find tucked away in many of the opinions of the commission which give us much ground for apprehension, because if the commissioners believe what they are saying in such instances, then our matters are being regulated by men who are governed to some extent by false doctrines. It is true the commission's orders do not always follow the extremes of its opinions, but they sometimes do, and so long as such opinions lurk in the minds of the commissioners the danger is there. Of course, Commissioner Lane does not entirely endorse this doctrine; he simply says that it is contended by the shippers "with much show of reason." Our position is that such contentions have no show of reason at all because they are based on false doctrines, and that they should not only not be used as a basis for an order, but that approval of them in whole or in part by the commission constitutes a danger to our business.

TRAFFIC.

The Chilean government has decided not to accept the bids offered for electrification of the government railway from Valparaiso to Santiago, and has appointed a new committee of engineers to draw up a new proposition and will ask for bids again.

The North Western Railway, Peru, which has just been completed, runs at present from Ancon, a little fishing town and summer resort, 24 miles north of Lima, through Huaral in the Chancay valley and Las Salinas along the Pacific coast, to Huacho. From Huacho it then runs inland up the Huaura valley to Sayan, situated at the end of the cultivated lands and at the commencement of the narrow mountain gorge ascending toward the summit of the Andes, a total distance of about 130 miles. The Chancay and Huaura valleys, which the line taps, are rich in cotton and sugar, and between 15,000 and 20,000 fattened pigs are yearly brought into Lima from these districts. There will also be an important traffic in live cattle, which before the operation of the new line were driven overland, traveling for days through the desert without food and water. Las Salinas, through which the line passes, is an immense natural brine-evaporating pan, five to six miles in diameter, where the finest salt is produced by simply clearing away the sand to a depth of 20 to 24 in., when, by the evaporation of the brine during the summer months, a perfectly pure salt block forms. Behind Sayan lies a mining district rich in silver and copper ores and also to a certain extent in coal. Parts of this district will probably be developed by the transportation facilities offered by the new line. The main line is 88 miles from Ancon to Huacho, and 35 miles from there to Sayan, with a branch line of 8 miles from Huaral to the port of Chancay. The line is 3-ft. gage, with 50-lb. rails. The maximum grade is 2.7 per cent., and the minimum radius of curve 328 ft., with the exception of eight or nine curves on the Ancon-Huaral section, where it was absolutely necessary to introduce very sharp curves to enable the line to surmount by turnings, without exceeding the above grade in the Ancon and Pasamaya hills, where the line rises almost from sea level to 1,371 ft., and without introducing switchbacks.

ILLINOIS CENTRAL'S NEW CENTRALIA YARDS

Operating Conditions Governing the Details of the Hump Yard and Other Facilities; Construction Features of the Work.

BY SHELBY S. ROBERTS,
Division Engineer of Construction, Illinois Central.

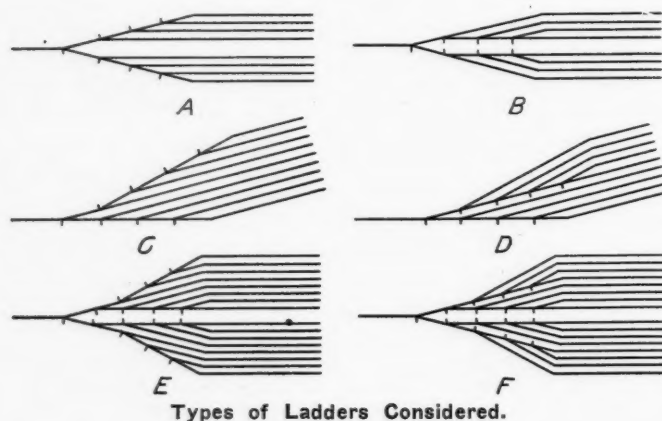
The freight business originating on the Yazoo and Mississippi Valley, the main line of the Illinois Central from New Orleans, the Birmingham line, most of that from the Kentucky division, and nearly all of that from the Southern Illinois coal field, concentrates on the main line of the St. Louis division, south of or at DuQuoin, Ill. Thirty-eight miles north of DuQuoin, at Branch Junction, this traffic from the south separates, going either to Chicago or to the Northwest. The freight trains passing north through DuQuoin are made up from contributions of traffic from all the sources mentioned above and are in through carload lots that must be separated somewhere between DuQuoin and Branch Junction. Owing to the character of the freight, when this separation is made, it is entirely practicable to further classify the freight so that full trains may be made up, say, for Wildwood, Fordham, Water Street and Hawthorne yards, Chicago, and for Peoria, Freeport and other northern and western points. Such trains require no further switching en route except the changing of engines and cabooses at engine district terminals and the possible reduction or filling out of tonnage due to grades or weather conditions on the several districts.

Such classification south of Branch Junction will relieve the increasing congestion and reduce the switching in all yards

land 500 ft. wide in addition to the old right of way, the site comprising approximately 275 acres, including the old right of way. Early in 1911 when the operating officers decided on the construction of these yards the property on both sides of the then existing main tracks between Centralia and Irvington was cross sectioned for a distance of 600 ft. on either side of the main tracks. These preliminary surveys developed that the formation of the ground west of the main tracks was better adapted for economical construction than that lying to the east. Consequently all later efforts were concentrated upon the development of the property on the west side.

OPERATING CONDITIONS.

All plans were based on the following general requirements: The main tracks had to be separated so as to build the yards between them in order to permit free interchange between the yards for north and south bound traffic without the necessity of yard movements crossing or opposing the movement of trains on either main track. All body tracks had to be of the same length and they and all lead tracks were to be of sufficient length to hold a train of 80 cars with an engine and caboose. The grades of all tracks, in the direction of their length, was to be governed, as far as physical and other conditions permitted, by the service for which the tracks were intended.

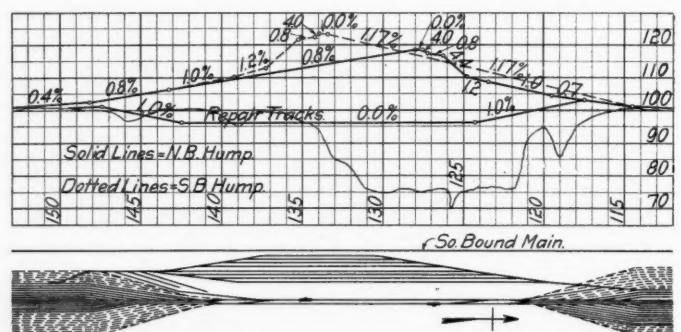


north of that point, and will consequently make possible a somewhat quicker delivery of freight to the points of consignment.

At present freight for Chicago and the Northwest is separated in tail switching yards located between Centralia and Branch Junction, while the engines from the St. Louis, Freeport and Illinois divisions, which terminate there, are taken care of by a roundhouse and facilities located just south of the passenger station at Centralia.

These facilities are inadequate for the present business and are so enclosed by Centralia and Central City that enlargement is impossible. Because Centralia is a division terminal, because of the inability to expand at the location of the old yards and because of the location of the mechanical facilities, the operating officers selected territory immediately south of the city for the new yards, and because of the possibilities of classifying the large volume of traffic, as previously outlined, they decided to build a summit or hump yard.

The new yards, now nearing completion, are located on the west side of the old right of way between the village of Irvington and the southern limits of Centralia and cover a strip of

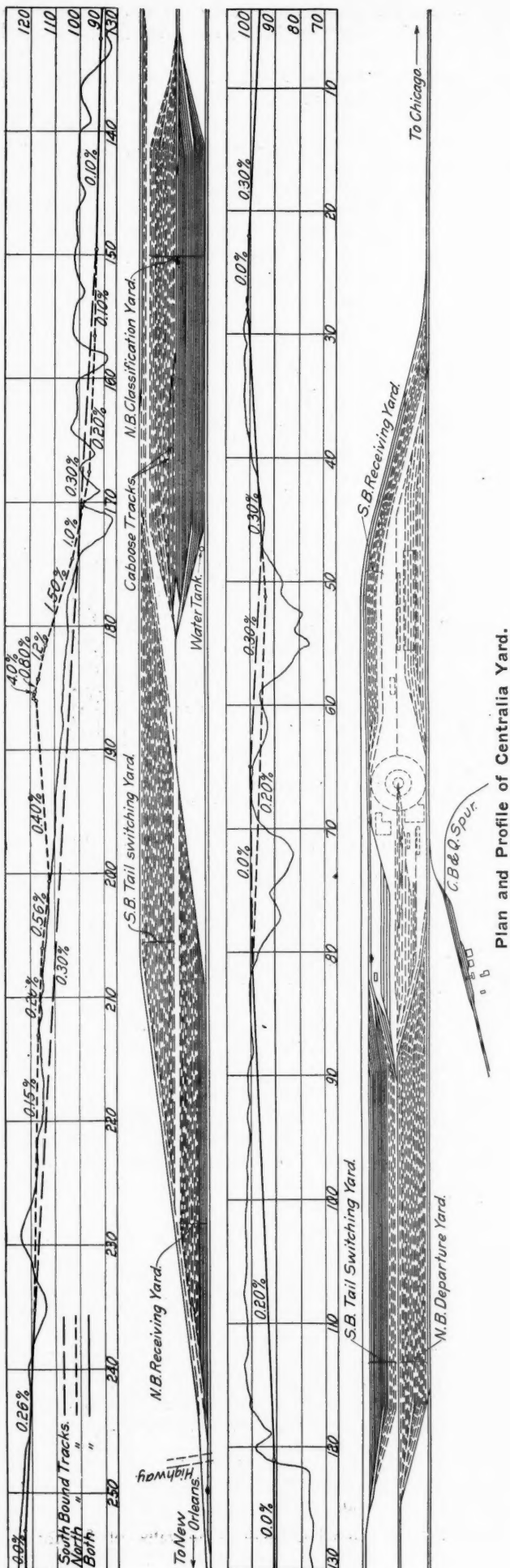


First Plan of New Centralia Yard.

All yards were to have cross grades to facilitate surface drainage. The distance center to center of body tracks had to be not less than 13 ft., and the main tracks had to be separated 550 ft. to provide for future development, in addition to present construction. Keeping these facts in mind, the plan shown in the accompanying sketch was first prepared.

This plan contemplated building a twin hump, one side for north and the other for south bound classifications, between two exactly similar yards, each offering a future development to 32 tracks, and so connected to the hump that any portion of either yard might be used as a receiving or a classification yard as the preponderance of traffic fluctuated. Between these two yards and west of the hump was shown a third yard for light repairs, with provision for a machine shop, mill building, car repair sheds, yardmaster's office and power house.

The apparent concentration and elasticity of operation of this plan, and the central location of repair tracks and buildings give a most favorable impression. But upon analysis the concentration and elasticity proved to be myths. There was much waste space. There was not enough provision for open or thoroughfare tracks. Even by allowing very heavy grading work, the best approach grade to either side of the hump was



very steep, and the grading was entirely from borrow. Should it become expedient for any reason to locate a roundhouse and accompanying mechanical facilities in the vicinity of the new yards there was no place between the main tracks where this could be done. For these reasons the plan was rejected.

The operating department at this time decided that south bound classifications at Centralia were not sufficient to warrant the present construction of a hump to care for south bound business. The plans were changed to meet these revised requirements.

The following comparative approximate statements give a fair idea of the scope of the work and the plans for future development.

CAPACITY OF YARDS.

	Present Construction.		Complete Development.	
	Tracks.	Capacity in Cars.	Tracks.	Capacity in Cars.
North Bound Traffic—				
Receiving yard	5	400	17	1,360
Classification	17	1,360	33	2,640
Departure	0	0	16	1,280
Caboose tracks	2	100	3	100
	24	1,860	69	5,380
South Bound Traffic—				
Receiving	2	160	8	640
Classification	12	960	16	1,280
Departure and tail switching.....	0	0	20	1,600
Caboose tracks	2	66	2	66
	16	1,186	46	3,586
Miscellaneous—				
Repair yard	0	0	9	323
Engine yard	3	91	13	296
Total	43	3,137	137	9,585

The foregoing represents the capacity of tracks in the clear upon which cars may stand in the normal operation of the yard, and does not include lead, ladder and thoroughfare tracks.

VOLUME OF WORK AND NUMBER AND CHARACTER OF BUILDINGS.

	Present Construction.	Complete Development.
Right of way.....	275 acres	275 acres
Grading, excavation	440,000 cu. yds.	780,000 cu. yds.
Culverts, concrete	5,700 cu. yds.	9,800 cu. yds.
Concrete pipe	1,100 lin. ft.	1,500 lin. ft.
Sub-surface drain tile	20,000 lin. ft.	40,000 lin. ft.
Main track	4.9 miles	4.9 miles
Yard tracks	25.4 miles	76.9 miles
Ladders, leads, etc.....	11.1 miles	14.2 miles
Total tracks	41.4 miles	96 miles
Frogs and switches.....	124	324
Track scales	2	3
Water works—		
30,000 gal. tank	1	1
100,000 gal. tank	0	2
Penstocks	1	4
Fire protection system	1	1 extended
Locomotive coaling plant	1	1
Inspection pit	0	1
Cinder pits	0	3
Locomotive crane	0	1
Buildings—		
General yardmaster's office.....	1	1
Assistant yardmaster's office.....	1	1
Asst. yardmaster's and scale office...	1	1
Scale house	1	2
Car repairers' houses	3	5
Tower for electric switch machine...	1	1
Air compressor house	1	1
50 stall roundhouse (100 ft. stalls)..	0	1
Machine shop	0	1
Oil house, tank, pumps, etc.....	0	1
Power house, with cinder pit and chimney	0	1
Store room and office.....	0	1
Dry sand storage bin.....	1	1
Sand bin and dryer.....	1	1
Rest room and toilet.....	0	1
Turntable pit and 85 ft. turntable...	0	1
Sanitary range toilets	0	2
Material shed	0	1
Material shed with offices.....	0	1
Car repair shed.....	0	1
Wood mill	0	1
Electric lighting, telegraph and telephone system	1	1 extended
Gasoline car to return riders to hump.	1	2

Provision was to be made for a receiving, classification and departure yard for north bound traffic, and a tail switching yard for south bound traffic with two lead tracks so located that they would form part of a future receiving yard and permit the construction of a hump under them without interference

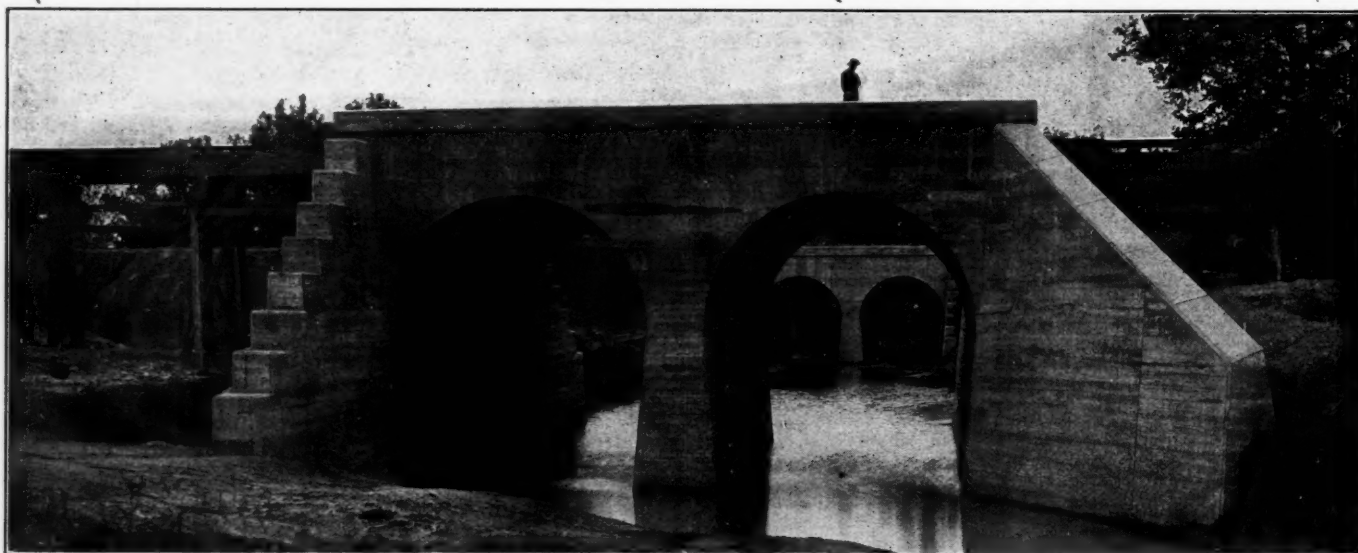
with other facilities, should future conditions justify it. Space had to be arranged for a future yard to be used as a departure or a tail switching yard for south bound traffic or both, also for a repair yard, an engine yard, a 50-stall roundhouse and accompanying facilities. It was also required that the grades be so laid that the excavations would make the embankments. The adopted plan and profile upon which the yards are being constructed are shown in an accompanying drawing. It is believed this plan fulfils the specifications, and in addition effects a considerable saving in first cost over the first plan. The grading and masonry work for the entire development of the adopted plan may be done for the same as, or slightly less than, the estimated cost of the present construction of the first plan. The approach grade to the hump is only 0.4 per cent. Ample open or thoroughfare tracks are provided, a point upon which practical yard men lay great stress.

GRADES OVER THE HUMP.

There is a decided difference between the adopted grades descending from the hump and those proposed in the first plan. An explanation of this change would seem pertinent, and a discussion of hump grades in general may be of some interest. It is well known that a grade giving satisfactory results for

grade or ascending grade at the departure end of the yard of sufficient length and magnitude to about bring the car to a stop near the end of the yard.

The above statements will doubtless be held incomplete and of little value for the reason that the rates of grade to be employed on the five different sections are neither given nor recommended. It would be of less value if in so general a statement rates of grade were given. The statement would then be misleading as well. An interesting statement of actual practice in a number of yards is given in the accompanying table, which with the exception of column 8, is taken from page 167, Volume 7, of the Proceedings of the American Railway Engineering Association, and is a part of a paper by W. C. Cushing, chief engineer maintenance of way, Pennsylvania Lines, Southwest System. To it has been added similar information concerning the Dupo yard of the Missouri Pacific, the Dolton yard of the Chicago & Eastern Illinois, and the proposed Centralia yard of the Illinois Central. As Mr. Cushing states, the speeds given in column 5 are probably about correct. Those in column 8 are doubtless greater than are actually attained in the operation of these yards, because in the theoretical computations no account has been taken of the resistance of the lead curves or that encountered on the ladders on account of



Double 16-Ft. Arch Under Centralia Yard.

one season of the year may not operate successfully in other seasons, and that grades giving excellent results in one section of the country will not be satisfactory in a remote section even during the same season. In short, even for a given locality it is impossible to calculate exactly what a grade should be or what velocity a car will attain on a given grade.

The rolling of a car depends, among other things, on the temperature, on the type of car, whether flat, box, ore, etc., and for the same type it depends on whether it is loaded or empty, on the time it has been standing immediately prior to being pushed over the hump, on the direction and velocity of the wind, on the curvature of the tracks and on the standards of maintenance of equipment and track.

A few pertinent facts developed from experience are: (1) The hump on which empties predominate should be higher and there should be steeper grades in the body tracks than where loads are in the majority; (2) the order of rate of grade should be: (a) a short steep grade to the scales; (b) a light grade over the scales; (c) a heavier grade to and through the ladders; (d) a grade, for a portion of the length of the body tracks, of sufficient magnitude to just overcome the rolling resistance of the car, so that the car will continue to move at the speed at which it entered the body track, and (e) a level

the guard rails, frogs, etc. The method employed in computing these speeds is that of Raymond, Webb, or the late A. M. Wellington. No account is taken of the initial speed of the car over the summit of the hump, and an averaged rolling resistance of 8 lbs. per ton is assumed, which is equivalent to a grade of repose of 8/20 or 0.40 per cent., which call "r." The grade producing speed equals the actual rate of grade, which call "R," minus the grade of repose "r" and is equal to (R-r). This "speed grade" multiplied by the horizontal length of the grade in stations of 100 ft., which call "L," equals the velocity head, which call "H," or it is the vertical height through which a body falling freely would have to fall to attain the same speed the car should have at the foot of the grade. The velocity head "H" is therefore equal to L (R-r). From the ordinary formulas of elementary mechanics for falling bodies increased by 4.63 per cent. to allow for the energy of the rotating wheels, it may be shown that H equals 0.035 S², where S equals the speed in miles per hour. From the foregoing:

$$S^2 = \frac{H}{0.035} = \frac{L(R-r)}{0.035}$$

Without solving this equation, having the value of H, the

corresponding speed may be taken from tables to be found in the works of either of the authorities named above.

The above explains how the values given in column 5 of the table were computed. For the values in column 8 the assumption is made that the speed at the foot of the first grade, as given in column 5, is the initial speed at which the car is moving when it starts to descend the second grade. Considering the grades independently, the velocity head for the first grade may be called H_1 ; that for the second grade H_2 . Then the velocity head for the descent to the foot of the second grade is $(H_1 + H_2) = H_3$ and the corresponding speed is $S_3 = \frac{H_1 + H_2}{0.035} = \frac{H_3}{0.035}$ which gives the same speed at

the foot of the second grade, whether the grades are taken together or separately.

The explanation of the method of computing the values given

is the same quantity for the second grade and H_3 is that for both grades. S_1 is the speed at the bottom of the first grade and S_2 the speed at the bottom of the second grade or the final speed. Equation (3) becomes

$$(4) 2gH_2 + S_1^2 = S_2^2, \text{ but } S_1^2 = 2gH_1, \text{ therefore}$$

(5) $2gH_2 + 2gH_1 = S_2^2$ or $S_2 = \sqrt{2g \cdot \sqrt{H_1 + H_2}} = \sqrt{2g \cdot \sqrt{H_3}}$ and is not $\sqrt{2g [\sqrt{H_1} + \sqrt{H_2}]}$ as used in computing the values for column 8 of the original table. The above gives results in feet per second. To express the results

in miles per hour (6) $S_2 = \frac{\sqrt{H_1 + H_2}}{0.035} = \frac{\sqrt{H_3}}{0.035}$. The orig-

inal table in line 1, column 8, gives the final speed as 19.4 miles per hour. In columns 3 and 6 the total fall, undiminished on account of resistances, is 9.2 feet. If the car in question, starting from rest, were to fall freely in a perfect vacuum through

YARD	First Grade From Summit				Average Remaining Grade From First Grade to Bottom of Ladders			Grade of Ladders Per Cent	Grade of Classification Yard Per Cent	First Grade From Scales When Any Per Cent	Distance From Summit to Center of Scales Feet	Standing Car Capacity All Yards	Character of Traffic
	Grade Per Cent	Fall Ft.	Horizontal Length Feet	Velocity at Foot M. P. Hr.	Fall Ft.	Horizontal Length Feet	Velocity at Foot of Ladders H. P. Hr.						
1	2	3	4	5	6	7	8	9	10	11	12	13	
Enola.....E.	3.5	4.2	120	10.2	5.	500	13.9	1.0	0.1	None	.....	10,705	Coal.
Enola.....W.	3.5	3.5	100	9.3	10.	700	17.2	1.4	0.3	None	.....	.....	Empties.
Altoona.....W.	3.9	5.8	150	12.2	13.8	1,500	19.3	0.92	0.29	None	.....	10,500	Empties and mdse.
Harrisburg.....W.	3.6	5.4	150	11.6	14.6	1,100	20.7	1.5 & 1.2	0.0	None	.....	10,015	Empties and mdse.
Conway.....E.	2.5	5.5	220	11.4	15.	2,800	15.5	0.5 & 0.3	0.3	0.53	.....	250	Ore, grain and mdse.
Conway.....E.	3.0	6.3	210	12.4	13.	2,000	17.2	1.0 & 0.3	0.0	1.80	.....	350	Ore, grain and mdse.
Conway.....W.	1.8	8.6	480	13.7	8.4	1,800	15.0	0.6	0.14	1.80	.....	220	Coal, coke and mdse.
Granville (mdse.).....E.	2.5	1.3	50	5.6	.....	.....	.....	1.0	1.0	None	.....	7,842	Merchandise.
Granville (coal).....E.	2.0	1.0	50	4.8	.....	.....	.....	1.0	1.0	2.0	.....	100	Coal.
Columbus.....E.	2.0	4.8	240	10.4	9.	1,000	15.9	1.0	0.8	2.5	.....	280	Mdse., grain and empties.
Columbus.....W.	2.5	8.8	350	14.4	7.5	750	18.4	1.0	1.0	2.5	.....	190	Coal, coke and mdse.
Alexandria.....N.	2.5	2.5	100	7.7	11.5	900	16.9	1.0	0.35	2.0	.....	170	.....
Alexandria.....S.	2.5	2.5	100	7.7	13.5	1,100	17.9	1.0	0.30	2.0	.....	170	Mdse. and produce.
Edgemoor.....N.	1.54	0.8	50	4.0	.....	.....	.....	1.5	.....	1.5	.....	80	.....
Edgemoor.....S.	1.0	0.7	70	3.5	5.25	300	11.3	1.75	0.0	1.75	.....	80	2,810
Logansport.....E.	2.4	3.0	125	8.4	7.	800	13.4	0.5	0.04	On Summit	.....	.....	Mdse., grain and empties.
Logansport.....W.	1.45	3.6	250	8.6	2.	450	8.9	0.43	0.4	On Summit	.....	.....	Mdse., coke and coal.
Crestline.....W.	3.0	7.5	250	12.5	2.	400	14.0	0.75	0.3	None	.....	1,784	Mdse., coke and coal.
Marysville.....W.	2.5	6.5	280	12.4	12.	1,000	19.6	1.2	0.0	2.5	.....	110	.....
Marysville.....W.	2.0	4.6	230	10.2	8.4	700	16.3	1.2	0.36	None	.....	1,756	.....
Scully.....E.	2.5	2.5	100	7.7	13.	1,000	17.8	1.3	0.5	2.5	.....	150	Coal.
Bradford.....W.	3.0	2.4	80	7.6	3.2	700	8.4	0.45	0.45	None	.....	1,715	Coal, mdse. and empties.
Ebeneser.....N.	1.75	14.9	850	18.	0.0	0	18.	1.75	0.57	1.75	.....	1,620	.....
Chicago, 55th St.....E.	3.0	4.5	150	10.5	3.5	700	11.5	0.5	0.17	0.5	.....	330	Mdse., grain & empties.
Chicago, 55th St.....W.	3.0	4.5	150	10.5	3.5	700	11.5	0.5	0.5 & 0.05	0.5	.....	400	Mdse. and coal.
Honey Pot.....W.	2.0	0.8	40	4.2	5.	500	10.2	1.0	0.12	1.2	.....	90	Coal.
Sheridan.....E.	1.67	2.5	150	7.3	6.	700	12.1	0.74	1.0	1.55	.....	170	Coal.
Richmond.....W.	2.5	2.5	100	7.7	2.	400	8.4	0.25	0.25	None	.....	745	Merchandise.
Linwood.....W.	3.0	1.	100	8.5	4.	400	12.0	1.0	0.0	On Summit	.....	656	Merchandise.
Mansfield.....E.	2.5	3.2	130	8.7	4.	600	11.1	0.2	0.2	1.0	.....	250	Mdse. and empties.
Mansfield.....W.	2.5	5.	200	10.9	2.5	400	12.1	0.2	0.2	None	.....	630	Mdse. and coal.
Chicago, Clear N & S.	2.5	5.	200	10.9	19.8	2,200	19.4	0.9	0.0	None	.....	14,000	Not in use.
Youngwood.....W.	1.74	1.4	80	5.6	.....	.....	.....	1.3	0.3	2.0	.....	120	Coal and coke.
Holidayburg.....	2.0	1.0	50	4.8	.....	.....	.....	2.0	0.9	2.0	.....	100	Coal.
Waverly.....	1.5	0.	600	13.6	.....	.....	.....	1.5	0.5	None	.....	.....	.....
DeWitt.....E. & W.	1.0	2.5	250	6.5	.....	.....	.....	.....	.....	None	.....	.....	.....
Winnipeg.....E. & W.	3.7	11.1	300	16.7	.....	.....	.....	.....	0.0	On Summit	.....	0	.....
Elkhart.....E.	4.3	12.9	300	18.3	.....	.....	.....	.....	0.16	.....	.....	.....	.....
Elkhart.....W.	5.0	15.	300	19.9	.....	.....	.....	.....	0.18	.....	.....	.....	.....
Dupo, Ill.....N.	4.0	0.6	15	3.9	21.2	1,125	22.2	1.20	0.4 & 0.0	5.00	.....	6.5	Merchandise.
Dupo, Ill.....S.	4.0	0.6	15	3.9	21.2	1,125	22.2	1.20	0.4 & 0.0	5.00	.....	6.5	Merchandise.
Dolton, Ill.....N.	1.92	2.01	105	6.7	12.91	1,125	16.9	1.5 & 0.5	0.0	3.00	.....	162.5	Mdse. and coal.
Dolton, Ill.....S.	3.00	3.00	100	8.6	16.50	1,300	19.9	1.0 & 0.67	0.0	3.00	.....	150.0	Mdse. and empties.
Centralia, Ill.....N.	4.00	1.00	25	5.1	21.60	1,775	21.0	1.5 & 1.00	0.1 & 0.2	4.40	.....	75.0	Mdse. and coal.
Centralia, Ill.....S.	4.00	1.00	25	5.1	20.22	1,625	20.4	1.5 & 1.00	0.2	4.40	.....	2,240	Mdse. and empties.

In calculating columns 5 and 8, the following data was used: A single loaded car weighing 150,000 lbs.—75 tons; rolling friction—8 lbs. per ton; grade acceleration— $f = 20\%$ rate of grade per cent. (Wellington p. 340); grade of repose, or grade to balance resistance to motion— 0.4% "Wellington's Railway Location," p. 335, Table 118. No initial velocity included in column 5. The apparent inconsistency between the results given by the last two lines of the above table and statements made elsewhere of the requirements of humps for loads and empties is, there is twice as much curvature in the ladder for Centralia's north-bound as for the south-bound yard and there are steeper grades on the body tracks of the south-bound yard. It is known that the speed at the foot of the second grade will be less than that in column 5 and it is believed the actual speed will be reduced more for the north than for the south-bound yard on account of the conditions mentioned, therefore it is believed the inconsistency is only apparent and not real.

TABULATED SUMMARY OF HUMP OR SUMMIT GRADES.

in columns 5 and 8 has been given in detail for the reason that the writer had to change all of the values given in the original table in column 8, because of a serious error therein. This may be shown as follows: In any mechanics there will be found expressions similar to these:

(1) $2aH = S^2$, meaning twice the acceleration times the distance traversed is equal to the square of the speed attained by the body. And where the body has an initial speed

$$(2) 2aH_2 = S_2^2 - S_1^2$$

By transposing $-S_1^2$ we obtain

$$(3) 2aH_2 + S_1^2 = S_2^2,$$

which signifies that twice the acceleration times the distance traversed plus the square of the initial speed is equal to the square of the final speed. In our case the acceleration is that due to gravity. H_1 is the vertical fall of the first grade diminished by the amount necessary to overcome resistance. H_2

a vertical distance of 9.2 feet it could acquire a speed of only

$$\sqrt{2 \times 32.16 \times 9.2} \text{ feet per second, which is equal to } 3600$$

$$\sqrt{2 \times 32.16 \times 9.2} \text{ or } 16.58 \text{ miles per hour, which is a short method of showing the error of the original table.}$$

The grades shown on the first plan were fashioned after those of the Dupo yard of the Missouri Pacific and the Dolton yard of the Chicago and Eastern Illinois, so as to be in a manner a mean between the two. However, since the actual speed developed by cars on these humps seemed excessive, and as it required a car rider or dropper on each car, the cost of operation was judged to be higher, and the possibility of damage to cars and contents appeared to be greater, than would obtain on hump grades of approximately the same vertical fall accom-

plished in a greater horizontal distance. This conclusion was drawn after watching the successful operation of the Youngwood yard of the Pennsylvania at Youngwood, Pa. (The rates of grades in this yard were lately reduced from those shown in the table.), and after obtaining the opinions of a number of old yard men and experienced operating men. After the rearrangement of grades at Youngwood a considerable saving in operating expenses was effected which was partly attributable to the installation of an adjustable mechanical hump and a new type of 150-ton one-track scale, but largely due, in the writer's opinion, to the readjustment of grades below the scales. On the readjusted grades the cars do not attain high speeds immediately below the summit of the hump. A car rider might in safety flip a car anywhere on the hump or might hold the first car of a cut below the scales by means of the hand brakes, until each car had been separately weighed and collected by him again into a continuous coupled cut and then taken on as such into the classification yard. In fact, one rider is able to handle a cut of from twelve to fifteen cars. Therefore the grades shown on the adopted profile were chosen.

In the past the Illinois Central has used the No. 7 frog very generally in yard work. With the advent of larger engines of long rigid wheel base and the desire to reduce curvature and curve resistance No. 8 frogs are used for all yard turnouts and crossovers at Centralia. The loss of space resulting from the use of No. 8 instead of No. 7 frogs is not great, the difference in angle being only 1 deg. 1 min., while there are gained the advantages of practically a 12 deg. instead of a 16 deg. lead curve and a saving of practically 3.2 lbs. per ton in resistances. All main track connections are made with No. 10 turnouts except where the new south bound main leaves the old main line at the north end of the yard. Here a No. 18 turnout is used to permit higher speed than permissible with a No. 10 and also in order to maintain the alignment of the new main track.

TYPE OF LADDER ADOPTED.

A further point of considerable discussion was the choice of the kind of ladder to use at the entrance to the classification yard. In making this selection six types of ladders were considered, the claims for and against which are here stated. Types "A" and "B" are used in small or medium sized yards up to, say, 16 to 18 tracks. The advantages claimed for type "A" are, (a) straight alinement of body tracks, (b) clear view of switches, and (c) adaptability to cross grades in the body of the yard. This type permits the use of a uniform grade on the body tracks and a steep grade on the ladder. The body tracks may be kept the same length by the use of a fish tail ladder or a "B" type ladder at the departure end of the freight yard.

The type "B" ladder occupies the same space in length and breadth of yard for the same number of tracks as type "A." The claim made for this type is that fewer switch tenders are required. From a careful study of the sketches, it is observed that there might be such a number of tracks that "B" could sometimes be operated with one less switch tender than "A." The same inspection, however, will also develop the facts that there is twice as much curvature in "B" as in "A," and that "B" does not permit of as logical an arrangement of cross grades as "A." Some maintain that the increased curvature makes no difference. Practical yard men say the curvature is a disadvantage, that it intimidates the car riders under certain circumstances and retards rapid movement of the trimming engine. From an engineering point of view it would appear objectionable because of increased rail wear and the increased rate of grade necessary to overcome the greater curve resistance.

Types "C" and "D" occupy the same space as either "A" or "B" and have the same total curvature as type "A," but differently distributed, advantage being given to one-half of the yard. Of the two, "C" seems preferable to "D." In a yard

where traffic is such that certain trains are made up chiefly of empties and certain other trains chiefly of loads, the type "C" might be used to advantage. The empties may be classified in the side of the yard having less curvature, which means less resistance, and the loads in that side having greater curvature and consequently the greater resistance. Thus even with a uniform profile grade one hump may, in a manner, give control over the difference in tendency of the load and empty to roll.

Types "E" and "F" are generally found in very large yards of more than 18 and up to 32 tracks, beyond which number of tracks it is hardly deemed advisable to go in one group of tracks. In both these types curvature is accepted to economize space and to keep the switches near the hump. The curvature is the same in each, but more advantageously located in "E." The ladder at the entrance to the classification yard of the adopted plan is a combination of types "A" and "E," which, it is believed, will prove more satisfactory than "E."

CONSTRUCTION FEATURES.

In the actual grading and masonry work at Centralia there are no unusual features. Slips and wheel scrapers were used in making the channel changes. Where the haul permitted wagons loaded by team and traction grading machines were used and in the longest and deepest cuts where the haul was long, steam shovels with dump cars propelled by locomotives were used. In constructing the large fills made from steam shovel cuttings a trestle was first constructed from which material was dumped until the embankment reached the height of the ties. The embankment was then made by dumping over the side and widening by means of an air operated spreader. The track on the trestle was thrown following the top of the bank, the stringers and caps of the trestle were pulled and the bank completed by filling under the traffic of the dirt trains. Shrinkage varying from 5 per cent. to 12 per cent. was used, depending on the depth of the fill and whether the fills were made by teams or steam shovels.

At the busiest time during the work there were five steam grading outfits at work, and three steam shovels, two serving standard gage 12-yard Western air dump cars and one serving a dinky outfit with three-yard hand dump cars.

The masonry work consisted of the extension of an 8-ft. arch culvert, the construction of two 10, one 12 and two double 16-ft. arch culverts. The concrete for the 8-ft. arch was mixed by hand and that for the remainder of the arches was mixed by machines. The material was unloaded from spur tracks, built near the site of the arches, mixed and dumped into small steel dump cars which were carried on trestles over the work to the point of deposit in the forms. The principal culvert is the double 16-ft. arch shown herewith. This illustration shows the temporary trestle built by the grading contractor, but the masonry contractor's trestle had been removed before the picture was made.

As the excavation for the north bound classification yard progressed the unexpected wet character of the material encountered made necessary the installation of a system of sub-surface drainage. This is composed of 6-in., 8-in., 10-in. and 12-in. farm drain tile laid parallel to the tracks in each alternate space between the tracks with 8-in. cast iron cross lines where the drainage is carried under the tracks. The north bound receiving and departure yards, the south bound departure yard and the engine and repair yards have a cross fall of 0.1 ft. per track from east to west. The south bound receiving and classification yards have the same rate of cross fall from west to east, while the north bound classification yard has the same rate of cross fall in both directions from the center. The profile grade of the classification yard represents the grade of the outside tracks. The track through the center of this yard is 1.6 ft. higher.

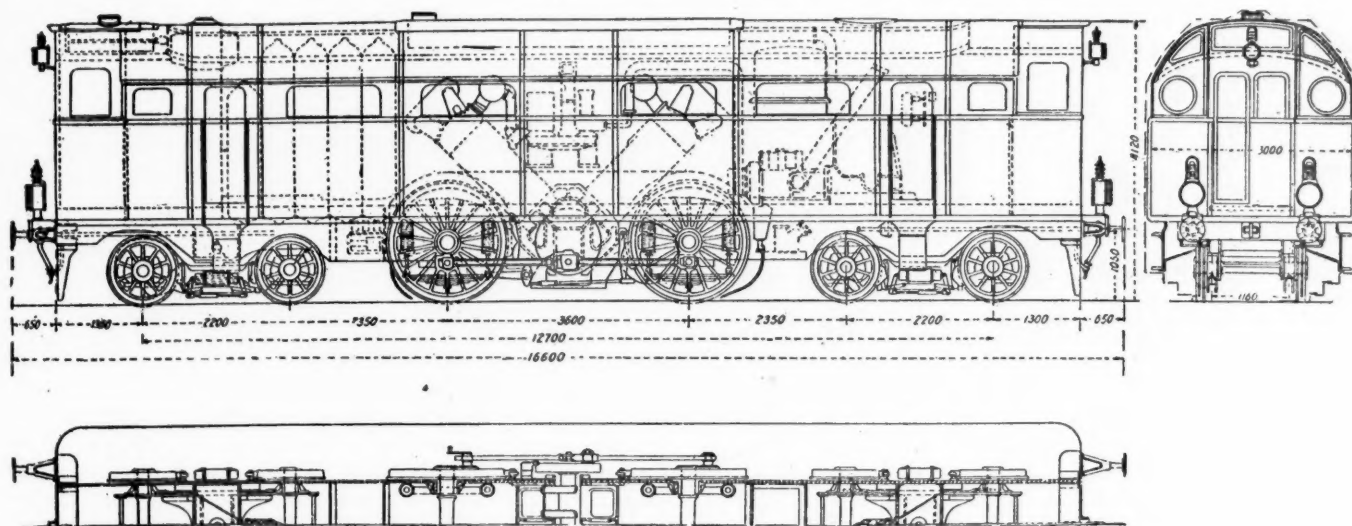
The method of operation of this yard will follow the general practice in hump yards and will be about as follows: A train

arrives and is admitted to the receiving yard. The road engine cuts off and goes to the roundhouse, while the conductor takes his bills, etc. to a yard clerk's office near the receiving yard, where the bills are checked and cards are prepared showing the routing of the individual cars. The "carder" then "cards" the train, which in the meantime has been inspected, special attention being paid to the condition of the hand brakes. This done, the hump engine sets off the caboose and pushes the train over the hump. At the summit a "marker" marks with chalk on the front end of each car, or the first car of each cut, the number of the classification track to which the car is assigned and on the end or side of the car near the end, the number of the track to which the next following car or cut should go. These numbers are for the guidance of the tower man who throws the switches. As a car or cut approaches the summit, it is uncoupled from those following. A short steep grade, called the "bunching grade," right at the summit assisting in this. As the car passes the summit, it is mounted by a car "rider" or "dropper," whose function is to so control the speed of the car by the hand brakes that there shall be no damage to the car or contents when it couples to the car that has preceded it into the classification yard. The movement of the hump engine is governed by the hump foreman by means of a high semaphore signal, and in addition a whistle is provided

THE DIESEL LOCOMOTIVE.

At the meeting of the American Society of Mechanical Engineers in New York on April 30, Dr. Rudolph Diesel, of Munich, Germany, delivered an address on The Present Status of the Diesel Engine in Europe, which included the following description of the Diesel locomotive:

"Of the Diesel locomotive nothing has heretofore been published. From the early days of my invention I have been of the opinion that the special features of the Diesel engine would be of even greater importance for transport purposes than for stationary work, and for that reason I have devoted much time to the development of the engine as motive power for transportation mediums. I have worked for five years, together with Sulzer Brothers, at Winterthur, and Adolph Klose of Berlin, on the construction of a Diesel locomotive, and the first express train locomotive of 1,000 to 1,200 h. p. was finished a few weeks ago, and is now on the testing bed in the Winterthur shops. Five years is a very long time, and to explain why the work has taken so long, I must mention that the thermo locomotive is the most difficult problem of construction that can be taken up in the way of modern engine building, not only on account of the difficulties in starting and manoeuvring with this special kind of motor, but



General Arrangement of a Diesel Locomotive of More Than 1,000 Horse Power Capacity.

near the summit. A signal having three positions will be used, one position to come ahead, one to stop and one to back up. A gasoline motor car will be used to return the car riders to the hump. While all of the above is taking place the bills are sent to the general yard office, where such information is taken off or added as is necessary and the bills are forwarded to a yard clerk's office near the departure yard.

As the classification tracks fill up, the cars are pushed into the departure yard and made up into trains, which, as soon as they are checked and the air is tested, are ready for the road engine to couple on and start, for the bills are usually ready as soon as or before the train is.

The grading, masonry work and the erection of the locomotive coaling station is contract work. The remainder of the work is being done by the railway company's forces.

This work was carried out under the direction of A. S. Baldwin, chief engineer, and D. J. Brumley, engineer of construction, the writer being directly in charge in the field.

In order to establish a better connection between St. Petersburg, Russia, and Odessa, a line 340 miles long has been projected from Shlobin to Kiev and Birsula. It is highly probable that this line will be built at once.

also on account of the limitation in space and weight. Compared with this, the development of the reversing and of the Diesel ship engine has been relatively simple. This locomotive, the car of which was made in the locomotive works of A. Borsig at Berlin, is shown in the accompanying illustration. It is about 54 ft. 9 in. long over the buffers and has two buggies of two axles each, and two pairs of driving wheels. The latter are not directly coupled with the engine, but indirectly with a blind axle, which is in the meantime the crankshaft of the Diesel engine.

"The Diesel engine is an ordinary two-stroke cycle engine with four cylinders coupled in pairs under an angle of 90 deg., and which drives the blind axle 3, cranks of which form an angle of 180 deg. This disposition gives complete balancing of the moving masses, the first and most important condition when putting such engines on a movable platform. Between the working cylinders are placed two scavenging pumps 5 driven by levers from the connecting rod. Beyond the engine in the roof of the car is placed the muffler, 6. On the right of the main engine stands an auxiliary engine, 7. This consists of two vertical two-stroke cycle cylinders, 7-7, coupled to horizontal air pumps, 8-8, driven by these cylinders. The cooler for the air compressed by these pumps is indicated at 9. These

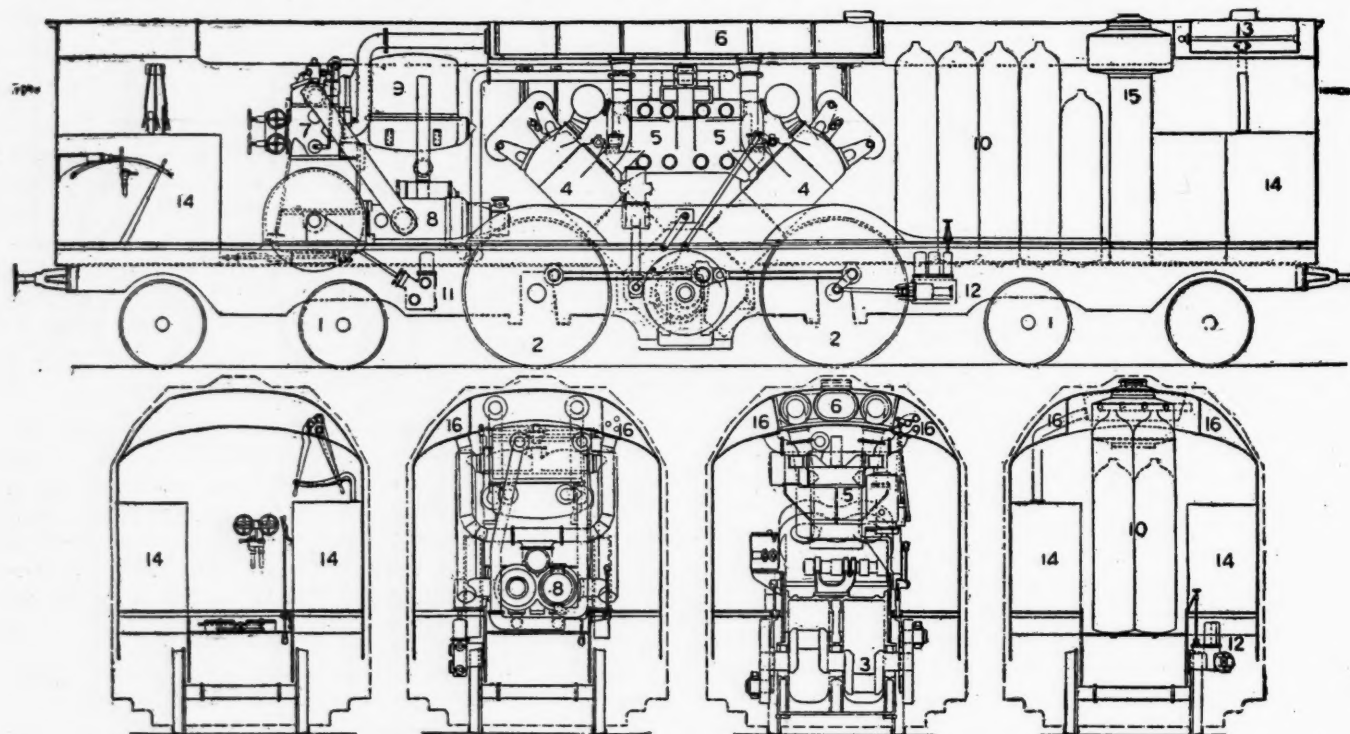
air pumps serve, according to a special and patented process, to increase the power of the main engine when starting, maneuvering and going uphill, in such a way that auxiliary compressed air and auxiliary oil fuel are conducted into the main cylinders, by which means the diagram is enlarged, making the engine as elastic as a steam engine. For the ordinary running of the locomotive the main cylinders work like ordinary Diesel engines without the help of the auxiliary. To the right of the main engine is placed a battery of air cylinders, 10, which help the action of the auxiliary engine and which can be refilled by the auxiliary engine at times when the latter is not used. Two pumps, 11 and 12, provide for the water circulation in the cylinder jackets. Apparatus for the back cooling of the water by evaporation is indicated at 13, and at 14 are the tanks for fresh water and for fuel. A small donkey boiler at 15 is for the heating of the train. The channels 16 under the roof lead the fresh air to the suction pipe of the different motor and pump cylinders. The whole plant is contained in a closed engine room, which makes the locomotive look from the exterior like a modern steel car.

"The engineer can operate equally well on either end of

It is estimated that the Curico to Hualane and Llico railway, Chile, will be completed in September of the present year.

The construction of the branch of the Bagdad Railway from Bagdad, Asiatic Turkey, to Aleppo was commenced on June 10. An inaugural ceremony was held at Alexandretta at the place where it is intended to erect the passenger station. That branch of the railway from Alexandretta to Aleppo will go via Payas, Doryole, Erzin, Osmania, Baghché and Killis, to Aleppo. Work has already been going on at the Aleppo end of the line toward Alexandretta for some months, as well as from Aleppo toward the Euphrates river. About 40,000 men are employed, with a pay roll of some \$220,000 per month, exclusive of the engineers and contractors, etc., which adds another considerable amount. Nearly all of the material being used is of German production, though most of the cheap tools are from Belgium. The work of construction of the entire line is expected to cover about seven years, so that an enormous quantity of tools and material will be required.

Under a government concession to Americans in 1910, for constructing a railway from Cape Haitien, Haiti, to Port-au-Prince,



Arrangement of Machinery and Apparatus on a Diesel Locomotive.

the locomotive, as the engine is arranged for running in both directions. He has a direct view of the track. Both doors and platform lead from the engine to the train. The total weight of the locomotive in service is 85 tons.

"I cannot predict whether this attempt at an entire revolution in the working of railways will be successful at the first attempt, or whether it must be repeated, but one thing is certain to me, the Diesel locomotive will come, sooner or later, according to the perseverance with which the problem is followed."

A railway is proposed from Hiitola, Finland, to Raasuli, and the scheme has been approved by the Finnish diet. The line will be of standard gage and will run from Hiitola via Kexholm and cross the Vuoksen river at the Kiviniemi rapids. The cost is estimated at \$2,871,000, of which it is reported that \$200,000 will be granted in 1913 for the construction of the Hiitola-Kexholm section. A concession has been granted to a company for the construction of a narrow gage line from Aggelby, near Helsingfors, to Hyönälä.

work was begun on the first 15-mile section from Cape Haitien to La Grande Riviere, in April, 1911, and about the same time on the 19-mile section from Gonaives to Ennery. The former has been completed and inspected by an engineer of the government, whose acceptance is awaited in order that the road may be put in operation. The Gonaives-Ennery section is being pushed and its completion is expected by September, 1912. The section completed is substantial, and has proved a great object lesson here. The equipment is also superior, the locomotives and first and second-class cars being of American manufacture, while the third-class cars were built in Haiti and mounted on American trucks. All construction material except the ties is imported from the United States, the contract stipulating that only native ties be used; however, in order to accelerate the work, the government permitted the importation of ties from the United States for the section just completed. This section traverses a populous region, taps one of the principal coffee districts of northern Haiti, and reaches the outskirts of a great virgin forest of logwood. The freight ought to be considerable from the start.

VALUATION OF RAILWAYS IN NEW JERSEY

Methods Adopted by Charles Hansel to Ascertain Value in
Accordance with the Statute; Results Obtained by the Work.

The valuation of the railways and canals of New Jersey which has just been completed is of much interest because of the difference in the conditions existing in that State, and in the other States where valuations have previously been made. The valuation in New Jersey included the property of seven large systems, the Central Railroad of New Jersey, the Delaware, Lackawanna & Western, the Pennsylvania, the Lehigh Valley, the New York, Susquehanna & Western, the Erie, and the Philadelphia & Reading, in addition to 35 smaller roads. The property of the larger systems was in turn sub-divided between a large number of subsidiary companies; that of the Central of New Jersey, for instance, being divided into 27 constituent properties. The valuation covers a total mileage of all tracks within the state of 5,449 miles divided as follows:

Miles of route	2,369
Miles of second track.....	897
Miles of third track.....	157
Miles of fourth track.....	140
<hr/>	
Total main lines.....	3,563
Miles of sidings.....	1,886
<hr/>	
Total miles of all tracks.....	5,449

A valuation was also made of two canal systems comprising 175 miles of canals.

This valuation did not include the property of the Hudson & Manhattan or the Pennsylvania Tunnel & Terminal Company or the Lackawanna Railroad of New Jersey, which is the new Lake Hopatcong cut-off of the Delaware, Lackawanna & Western. At the date set for making the valuation the Lackawanna cut-off was not completed or in operation, and the Hudson & Manhattan and the Pennsylvania Terminal properties were considered special and distinct problems which did not come within the scope of the investigation.

This is the first state in which a valuation has been made where a large proportion of the railway mileage consisted of highly developed multiple main tracks with very extensive terminals and with a large amount of floating equipment, including tugs, car ferries, etc., so that the problems presented differed essentially from those in Michigan, Wisconsin, Minnesota, Texas, Washington and South Dakota, where valuations have been previously made. Most of the lines in New Jersey were built many years ago to low standards and have since been brought up gradually to their present high condition. Few of them were built originally by the companies now operating them and no profiles or construction records were available in making the valuation. In many cases it was also impossible to secure right of way maps and records for the same reason. The problem was further complicated by the lack of any statistics of intrastate traffic, as the laws of New Jersey do not require the railways to report information of this character to the state.

The valuation was undertaken in accordance with an act of the legislature approved April 5, 1909, under the direction of Charles Hansel, expert in charge, who organized a corps of ninety men and proceeded to measure all railway property within the state. This valuation was authorized to determine the value of the railway properties for the purpose of taxation, and for this reason it was necessary to conduct it in accordance with a statute of 1884 relative to the taxation of railway and canal property. This statute divided the property into four sub-divisions:

- (1) The length and value of the main stem of each railway and of the waterways of each canal.
- (2) The value of the other real estate used for railway or canal purposes, including the roadbed other than the main

stem, tracks, buildings, docks, piers, etc., and all other real estate except lands not used for railway or canal purposes.

(3) The value of all tangible personal property of each railway and canal company.

(4) The value of the franchise.

This act was amended in 1888 so that sub-division 4 would include "the value of the remaining property, including the franchise"; in other words, providing that all values of any kind not included in the items of real estate and tangible personal property should be placed here. The valuation was made in accordance with this consideration and no attempt was made to place a value upon the franchise separate and distinct from the value of the remaining property, but rather the value of the franchise was merged into the broader term, the value of the remaining property.

However, because of the difficulty of determining this intangible value a large amount of space was devoted to the report to an outline of the methods adopted to ascertain this value in accordance with this statute. "It seems manifest," says the report, "that the franchise to be, to exist, is only one of the franchises of a corporation. The franchise to do, to carry on the business of a corporation, is an independent franchise, or rather, a combination of franchises embracing all things a corporation is given power to do, and this power, this authority, constitutes a thing of value and a part of the corporation's intangible property as much as do the franchises to be. . . . It would seem that these intangible properties, these franchises to do, exercised in connection with tangible property which it holds, create a substantive matter of taxation to be assessed by every state in which that tangible property may be found."

"Considering the elements involved in sub-division 4 as being capable of reduction to a commercial value, it becomes necessary to construct a method or formula which will satisfy a reasonable interpretation of the value of the intangible quantities of railway property. Since the property under consideration is intangible we cannot inventory it nor apply any generally accepted method of determining its dimensions or unit value, and it is probable that any formula offered will, in many cases, fail to satisfy all the conditions."

It was considered that the par value of the stocks and bonds cannot form a basis for this value, for, especially in the early days, when a large proportion of the lines within this state were built, much water was injected, either intentionally or in order to dispose of the bonds, while frequently the stock was distributed as a bonus with the bonds. Obviously, this could not form a fair basis for the value of the property. Likewise the market value of the stocks is not an indication of the value of the railway property alone. The market value is based on the income from all sources, including that received from other than railway operation. Several of the railways within this state, such as the Lackawanna and the Pennsylvania, derive a large income from the operation of coal properties and other properties entirely outside of the field of railway operation. "If this market value were used it would reflect on to the railway property under consideration the value of other property which may be in no wise related to it."

Likewise, in some cases, the stocks and bonds have no relation to the value of the property. As an instance of this, the Lehigh Valley leased the Morris Canal & Banking Company in perpetuity in 1871, agreeing to pay 4 per cent. on the common stock and 10 per cent. on the preferred stock, also 7 per cent. on the bonds. The value of these stocks and bonds is thus maintained regardless of the fact that the canal is operated at an annual loss of approximately \$100,000. In a similar manner

the funded debt cannot be used as a basis, for in many cases it has been very largely reduced by the application of large amounts for betterment purposes.

Since these values cannot be used as a basis on which to establish the value of the property it is necessary to look to other conditions. One condition contributing largely to the value of the property is the organization, which, as here used, includes "both the operating officials and the employees, together with the machinery, equipment, gradients and permanent way. . . . In considering organization we must couple it with all the conditions which make for net earnings, such as location, shortness of line and density of traffic. . . . While the physical value of the least costly road as represented by the real estate and the tangible personal property may total much less than that of its competitors, its commercial value may be much greater by reason of its maximum trainloads and its minimum operating expense. . . . The ability to pay taxes is expressed in the corporate net surplus available for taxes and surplus. Consequently, it is to this item we look for a basis in determining the value of the remaining property, including the franchise."

To determine this value, the following method was decided upon:

"A—The investment value of the physical property before depreciation. This is determined by the present value of railway lands used for railway purposes plus the present cost of producing roadbed track and appurtenances of the permanent way

the interest, exchange, etc.; (I), and the interest of the funded debt incurred in operation (J), are deducted from the available corporate income, the balance being the surplus available for dividends. This surplus is capitalized at a rate such that it yields a definite net income after the payment of taxes, and is added to the present value of the real estate and tangible personal property (B) to give the total value.

"The determination of the annuity of (F) is of great importance, as a slight variation in the rate applied to the gross investment value (A) will materially affect the surplus available for dividends, and consequently the value of sub-division 4. . . . The rate of 5.5 per cent. on the estimated cost of producing the permanent way, structures and personal property plus the normal value of the land at the date of valuation, will, in our opinion, produce a greater sum than is paid as interest charge on the property." . . . "It seems just to consider a larger rate of annuity in the case of the unclassified roads that are unimportant and whose earnings, be they ever so satisfactory, would not be of sufficient importance to enable them to borrow money or to finance additions and betterments without a considerable discount commission and a rate of interest somewhat higher than the better roads would pay, and in some cases it might not be unreasonable to fix the annuity rate at 8 per cent. For the purpose of this report, however, we have used 5½ per cent. throughout."

The importance of the ratio which the value of terminal properties in this state bears to the value of the remaining properties

VALUATION AND CAPITALIZATION OF RAILWAYS OF NEW JERSEY.

Road.	Mileage of road.	Value New.	Value of Subdivision IV.	Present Value.*	Average Valuation per Mile.	Capitalization.			Average Capitalization per Mile.
						Stock.	Bonds.	Total.	
P. R. R.	758.5	\$125,969,589	\$20,899,800	\$119,783,212	\$157,921	\$66,697,975	\$37,664,200	\$104,362,175	\$137,590
C. R. R. of N. J.	443.7	65,099,170	22,278,200	72,181,458	162,681	36,475,600	48,259,000	84,734,600	190,972
P. & R.	229.8	14,987,117	4,836,800	15,726,865	68,437	7,634,000	7,950,000	15,584,000	67,815
Erie	159.6	33,464,450	3,510,500	31,216,628	195,593	6,583,500	15,199,600	21,783,100	136,485
D. L. & W.	208.1	63,418,581	11,318,100	59,485,383	285,850	19,115,034	34,971,000	54,086,034	259,904
N. Y. S. & W.	127.0	8,505,873	367,000	7,266,650	57,218	26,215,000	12,438,000	38,653,000	304,350
L. V.	121.0	39,920,450	7,105,700	37,541,393	310,259	20,467,777	17,675,500	38,143,277	315,233
Total	2,048.0	\$351,365,230	\$70,316,100	\$343,201,589	\$167,578	\$183,188,886	\$174,157,300	\$357,346,186	\$174,485

*Arrived at apparently by making a deduction from "value new" for depreciation and then adding subdivision IV.

plus the value of the tangible personal property plus the abandoned property if any.

"B—The appraised value of real estate and personal property as in A, less depreciation by reason of decrepitude and obsolescence.

"C—This item should include all gross earnings and income of every kind whatsoever, except earnings from real estate not used for railway purposes and income from securities.

"D—Operating expenses exclusive of taxes, including every item of expenses incurred in operating, hire of equipment, joint facilities, miscellaneous rents paid, etc., except rent of property not used for railway purposes.

"E—Available corporate income. This item was determined by deducting the item of operating expenses D from the gross earnings C.

"Annuity or fixed charges, 5½ per cent. of A.

"G—Taxes on the appraised value as represented in item B. This rate is based on the tax rate used by the state board of assessors.

"H—Income from property not covered by appraisal. This item should include all rentals from third class property, that is, property not used for railway purposes.

"I—This item includes all payments for interest, exchange or discount, on interest bearing current liabilities, interest on receivers' certificates, notes, open accounts, and other analogous items.

"J—This item includes interest on funded debt incurred by loss in operation."

In applying this method the annuity on the gross investment (F), the taxes on the present value of the physical property; (G), the income from properties not covered by appraisal; (H),

rendered necessary a very careful consideration of the methods to be adopted in establishing their value for purposes of taxation. The tidewater terminals are a part of the entire railway system.

"The Pennsylvania Railroad Company has recognized the value of New York terminals to lines included in its system lying remotely from New York, and some \$10,000,000 were charged to lines west of Pittsburgh.

"We think that portion of line of any interstate system operating in New Jersey with tidewater terminals made necessary for the business of the system should not be required to pay the interest charge and taxes on the entire value of the second class, terminal property. . . .

"The interest charge and the taxes are deducted from the net revenue before the net surplus is determined. Consequently, if we charge the annuity of 5½ per cent., and the taxes on the total value of the terminals outside of the main stem, the net income from rail operations may be wiped out, and since we are called upon to establish the true value of the railways in the state, we think that the annuity should be charged on only the proportion of the value of the terminals outside of the main stem which is properly chargeable to the lines within the state.

"We are not unmindful of the fact that there are terminals outside of the state the value of which may properly be apportioned to lines within the state. We have charged the annuity on all values within the limits of the main stem to the line within that state which uses same, although a large amount of interstate business is discharged at the tidewater terminals within the limits of the main stem."

In reference to the valuation of the main stem, sub-division 1, the report states that "if the boundaries of the main stem were

limited by the area of land covered by the roadbed and not exceeding 100 ft. in width, it is evident that the width of the strip of land constituting the main stem will be constantly varying and the outline of the same will be marked by the toe of slope of all embankments and the line of excavation in all cuts, and it would be exceedingly difficult to compute the areas and quantities in the main stem and to fix the proportionate amount between the main stem and second class property.

"The practice of the state board of assessors has been to fix the boundaries of the main stem by a strip of land not exceeding 100 ft. of uniform width with its rail and sleepers, and of structures erected thereon and used in connection therewith not including, however, any passenger or freight buildings erected thereon."

The value of the real estate and the tangible personal property was fixed without regard to its use in accordance with decisions of the courts based on the tax statutes of 1884 and 1888. "Having eliminated the element of use we reduce the question to the naked value of the land apart from the improvements thereon and disregard the cost to acquire for railway purposes. We are not instructed to determine the cost to produce the land; we are required to determine the value.

"The right of way is frequently broken by cross streets, streams and rivers. The power to cross these streets and waterways is given by the state through the charter to build and operate a railway. The main stem land is therefore merely broken sections or strips of land and any additional value they may have over the contiguous lands by reason of the closing of the gaps by the power of the state is, we think, reflected in the value of the remaining property, including the franchise. . . .

"The cost of acquiring the land has not been taken into consideration, as has been frequently done by other states which have attempted to determine the value of the physical property of railways, except that administration and interest at 7 per cent. has been added to land in the main stem. . . .

"The law tells us to eliminate from our consideration the purpose to which the land is applied. Therefore, we have valued the land stripped of all improvements as a piece of naked land in the open market for any reasonable purpose to which it may be applied. The presence of a railway with its embankments, permanent way and structures, and the operation of traffic over same, may depreciate or appreciate the value of the adjoining lands. Consequently, the true value is so closely interwoven with the value for a specific purpose that it is difficult to determine whether the value of the adjoining lands would be enhanced or depreciated by the absence of the railway with its embankments and the operation of trains over the same. . . .

"The majority of the terminal lands were acquired at an early date and a vast amount of material has been required to bring the surfaces of the lands to the present elevation and state. The depth of water in the Hudson river in front of water front lands is a material factor in considering the value of terminal lands. The area of fast land, its form and general dimensions, location north and south, and the possibilities of pier development are all important elements in determining values.

"The writer cannot agree with the opinion that cost of reproduction as applied to land areas, especially under the conditions attendant upon the development of large terminal tracts upon the Hudson river, is a true measure of true development under the laws of the state as interpreted by its highest court. 'Values are not necessarily large where the cost of reproduction would be heavy, while values may be great where the cost of reproduction would be relatively small.'"

In valuing the rolling equipment and machinery depreciation was considered under two heads, first, depreciation on account of decrepitude or wearing out; and second, obsolescence. The effect of supply and demand upon the value of the equipment is also considered in the report. "It is believed that the true value of equipment can be established only after careful consideration

is given to all the elements which affect value, and for this reason every phase of the question has been gone into. Decrepitude and obsolescence do not measure the full amount of deduction from original cost in years of lean business when there are many thousand idle cars. The percentages of depreciation used by railway companies in accordance with Interstate Commerce Commission requirements are not for the purpose of establishing present value of equipment. . . .

"None of the lines within the state, except the Delaware, Lackawanna & Western, reports distinct intrastate accounts of earnings, operating expenses, ton miles train miles, car miles or any of the elements of unit measurement which would enable us to definitely assign the various classes of equipment to the state. . . .

"The ratio of earnings of the Delaware, Lackawanna & Western in the state to the total earnings shows an increase of 27 per cent. over the percentage of track within to the percentage of track without the state. If, therefore, we assign the value of the total equipment of the Delaware, Lackawanna & Western to this state on the basis of a revenue from operation we will assign 27 per cent. more value than if the single track mileage were used as the basis.

"The ratio of all tracks to single line is significant, showing more nearly the capacity to do business and this increased per cent. over the single line is reflected in the earnings. So far, at least, as the Delaware, Lackawanna & Western is concerned, it seems proper to assign the value of equipment to the state of New Jersey on a basis of 30 per cent."

Discussing gross earnings as the basis of apportionment, the report says: "This plan is faulty for the reason that many of our largest railway systems do not attempt to separate their revenue and operating expenses into states, and where required to report state business to the railway commission the track mile basis is generally used. In many cases recourse was had to all-track mileage, and it seems that when finally analyzed the commercial valuation referred to was based on all-track miles. . . .

"We have given careful consideration to the several bases for apportioning interstate railway values to states, such as single track, mileage basis, all-track mileage, funded and other debts, station population, car mileage, cost of construction, density of traffic, gross earnings, net earnings, and cost of reproduction at this time. We believe that the proper basis to adopt in the absence of information giving car miles and actual intrastate earnings and operating expenses is the miles of all tracks of each road in the state as related to the miles of all tracks for the entire line.

"The states of Michigan, Wisconsin and Minnesota made an apportionment of equipment supposedly on car mileage within and without the state, but since no division of car mileage is kept within this state and must be determined by some empirical rule, it is better to adopt the empirical rule direct."

In determining upon the values of track materials the following table was prepared showing the life of the principal material under main line service within the state as reported by the principal railways. While the statements are apparently to some extent general estimates, they, however, serve as a fairly accurate guide:

Name of Road.	Rails, Life.	Ties, Life.	Stone Ballast. Renewed per Year.
Erie	6 years	6 years	10 per cent.
Lehigh Valley	9 years	10 years	6 per cent.
Lackawanna	5 years	7 years	6 per cent.
Reading	6 years	8 years	13 per cent.
Pennsylvania	8 years	6½ years	9 per cent.
Average	6.80 years	7.50 years	8.80 per cent.

The price of new Bessemer rails was taken at \$30 per gross ton delivered, including transportation, \$1.60, and cost of distribution, 40 cents. A loss of 10 per cent. was allowed in estimating the weight of rails removed from main line service and classed as relayers, while it was also estimated that 10 per

cent. of the rails taken out of main line track were fit only for scrap. While a considerable mileage of open hearth, ferro-titanium and other special rails are in track, it was not considered for the purpose of the estimates that they had been in service sufficiently long nor had their use become sufficiently general to classify them as standard. The average market price of relayer rail was assumed at \$23.

The original cost of labor in laying and surfacing track, and the extent to which this would remain even after the abandonment of the track, was discussed at some length.

The question at best is considerably involved, and to offset any argument which might be advanced to the contrary the assumption has been made in the estimates that the labor for surfacing remains undiminished in value and that this item amounts to one-half for labor for laying and surfacing, while the other half, or the labor laying, fluctuates in value between 100 per cent. and zero, thus giving an average value of 50 per cent. for that portion of the labor applicable to the laying of the rails, and therefore, an average value on the whole of 75 per cent. of the total. While no convincing argument can seemingly be advanced for doing this, still, to be conservative, it has been made as a concession and not in the nature of an admission that the premises upon which the argument is founded are correct.

"The solidification of roadbed by reason of settlement through age and use has not been taken as an element of value for the purpose of this report. This solidification and settlement of roadbed has been an element of cost and must be provided for. The railway company is entitled to claim this cost as a part of its investment. We have no means of determining the amount of solidification or settlement even approximately, and have not therefore attempted to fix any definite unit of values for same."

The actual valuation determined for the seven principal roads is given below, with the capitalization of the same roads, and both valuation and capitalization have been reduced to a per mile basis. The valuation varies from \$57,218 per mile for the New York, Susquehanna & Western to \$285,850 per mile for the Delaware, Lackawanna & Western. Of the total valuation of \$343,201,589, the amount included for franchise and all values not included in the item of real estate and tangible property was \$70,316,100. The valuation for the 35 unclassified roads, comprising 321.3 miles, amounts to \$31,558,836, of which \$5,525,500 was for subdivision IV. It will be noted from the table that the value of subdivision IV was fixed closely equal to the depreciation allowed, or in other words that the value new of the physical property with no allowance added for intangible value exceeded the present value with allowances made for depreciation and intangible values by only about 2 per cent. In this regard this appraisal closely agrees with those previously made in Wisconsin, Michigan and Washington.

The plans are out for the new railway station in Valparaiso, Chile, to cost about \$500,000. It is to be up-to-date and equal to any in the country.

Extensions of the existing Egyptian state railway system, which were begun in 1910 to connect several points in the Delta and elsewhere were brought to completion during 1911. The year was a good one from a financial standpoint; the receipts of the state railways for 1911 were \$18,455,895, an increase of \$1,455,565. The total number of passengers carried was 27,941,187, or over 2,000,000 more than in 1910. The expenditure on new equipment and extensions amounted to \$2,233,325. Of this sum \$476,560 was spent on signaling and on remodeling various stations, \$424,540 on the extension of new lines, \$311,565 on bridges, and \$136,210 on preliminary work in connection with the building of a large modern station at Alexandria. The balance was expended on miscellaneous additions and betterments.

STEAM LOCOMOTIVES FOR HIGH SPEED PASSENGER SERVICE.

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It is intended to present a summary of the distinguishing characteristics of the steam locomotives used in the high speed passenger service of the United States. The term "high speed," as used in this connection, refers to service in which trains are operated at an average speed of not less than 50 m. p. h. over divisions approximating 100 miles in length. The weight of the train (exclusive of engine and tender) may vary between 300 and 500 tons. Under favorable circumstances considerably higher speeds are frequently maintained for shorter distances, even with trains of normal weight; while with lighter trains, very much longer runs are occasionally made at speeds of more than 50 m. p. h. Consideration is limited to the usual daily practice as above defined.

The typical modern American high speed locomotive is either a 4-coupled or 6-coupled machine, of one of the trailing truck types. For the lighter trains the Atlantic (4-4-2) type is preferred, while for heavier service the Pacific (4-6-2) type is used. Both of these types owe their development primarily to a demand for greater heating surface, and larger grate area than could be obtained by adherence to the types which had preceded them, namely, the American (4-4-0) and the ten wheel (4-6-0). In the development of these earlier types, the desired increase in heating surface was for a time obtained by a simple increase in boiler dimensions; a form of development which continued up to the attainment of the allowable limit of the weight upon the drivers. The growth in the area of the heating surface which was thus secured was at first accompanied by a relatively small increase in grate area. This was due to the difficulty of expanding the firebox, on account of its position between the driving wheels, which prevented an increase in width. The firebox was gradually lengthened, but the long grates thus obtained made proper firing difficult and the limit in this respect was soon reached. The demand for larger grates and boilers continued, however, and the Atlantic type locomotive was developed in response to this demand. In this type the firebox is carried over a small wheel trailing truck and the grate may therefore be increased in width, while its length may be reduced to such a point that the fireman can reach and cover all parts of the grate surface. The firebox being back of the drivers, the boiler can be increased in length and greater heating surface obtained without trenching upon the limits of allowable outside clearance dimensions. The presence of the trailing truck has made it possible to relieve the weight on the drivers.

The first Atlantic type locomotive was built in America in 1895, and, during the six years which followed, it fully justified its design in service. It has since quite displaced its prototype, the 4-4-0 engine, in such service as is here considered. Under the persistence of the demand for still greater steaming capacity the Pacific type has logically followed the Atlantic.

The 4-4-2 type is usually preferred for trains of moderate weight (from 300 to 350 tons), and for service where heavy grades are not encountered, it is the prevailing type. It combines a four-wheel leading truck of good guiding properties, with four coupled drivers and a two-wheel trailing truck. Except on roads with sharp curves the trailing truck need have no radial motion. This wheel arrangement provides a short, rigid wheel base and a relatively short total wheel base. Consideration of the last mentioned characteristic leads occasionally to the selection of this type for trains somewhat heavier than those cited above. For trains of more than 350 tons weight, or for lighter trains on roads with heavy grades, the Pacific type is generally used, and it is to be regarded as the typical locomotive for such service. It produces greater accelerations in starting than does the Atlantic type. Owing to its longer wheel base, its trailing truck

is generally designed to allow radial motion. Up to about two years ago the Prairie (2-6-2) type was occasionally, although rarely, used in this service. At present its use is so exceptional that it is may not properly be regarded as a characteristic type for high speed service as here defined.

CHARACTERISTICS OF DESIGN OF HIGH SPEED LOCOMOTIVES.

High speed locomotives are distinguished by high steam pressure, large grate surface, large heating surface, and large driving wheels. A review of current American practice leads to the following conclusions concerning these and other characteristics of design.

High Steam Pressure.—The pressure most usual in the American passenger locomotive boiler is 200 lbs., although pressures as great as 225 lbs. have been used. The check to the tendency toward increase of pressure is due largely to the influence of the investigations of Dr. W. F. M. Goss, who has shown that general locomotive efficiency is probably better promoted by steam pressure in the neighborhood of 180 lbs. rather than 200 lbs., or higher pressures. His conclusions are the result of exhaustive laboratory tests, and are set forth in his treatise on High Steam Pressures in Locomotive Service.

The outline of his argument is as follows: Any increase in steam pressure must be accompanied by an increase in the weight of the boiler. If, however, increased engine weight is permissible in a given case, it is also possible to utilize this additional weight in increasing the size and capacity of the boiler, the lower pressure being maintained. In either event a saving of fuel will result, i. e., whether the pressure be increased, or whether the pressure be maintained and the heating surface increased. Considering pressures not lower than 180 lbs., the tests referred to demonstrated that the fuel saving was the same whether the permissible weight increase was used in an increase of pressure, or in an increase of heating surface. This fact eliminates the question of fuel economy and reduces the argument to a consideration of costs of operation and maintenance as dependent upon leakage, boiler troubles due to impure water, boiler maintenance, etc. With the consideration limited to such matters it is easily demonstrated that a pressure of 180 lbs. will result in the highest general efficiency. Thus far, however, there is observable no tendency to reduce the pressure below 200 lbs., largely because the demand for capacity has been so urgent as to overshadow temporarily the available gain in economy.

Large Grate Surface.—The grate area for passenger locomotives burning bituminous coal lies between the limits of 40 and 55 sq. ft. The movement towards the adoption of large grate areas, which had its beginning about twenty years ago, has suffered no reversal. It has already been pointed out that this movement was the immediate cause of the development of the types of locomotives here considered. With the wide fireboxes used in these types, the fireman has little difficulty in properly feeding even so large a grate area as 55 sq. ft., and by the use of such grates, the action of the draft upon the fire is less severe and fuel losses in the form of sparks are diminished.

Large Heating Surface.—Assuming adequate grate area, the capacity of a locomotive for the continuous production of power is limited primarily by the heating surface of its boiler. Any addition to heating surface is attended by either a decrease in fuel consumption for the same power, or by an increase in power for the same fuel consumption. We are prepared then to find, as is the case, that in recent Pacific type locomotives the heating surface runs as high as about 4,500 sq. ft., and in the Atlantic type about 3,700 sq. ft.

Driving Wheel Diameters.—Up until about 1894-1895, it was the general practice in this country to use driving wheels of relatively small diameter (from 60 to 68 in.). Under this practice the driving wheels of fast passenger locomotives were driven, in ordinary service, at speeds varying between 300 and

400 r. p. m. A marked increase in size of drivers has, however, taken place since that time and typical modern American high speed locomotives generally have driving wheels of from 70 to 80 in. in diameter. A few recent normal designs have driver diameters as great as 85 in.

Cylinder Volumes.—Characteristic cylinder diameters are 20 to 22 in., with the stroke about 28 in. Cylinders of these sizes develop maximum tractive efforts varying between 25,000 and 32,000 lbs. These tractive efforts are not such as to realize the full adhesive power of the locomotive, since the prevailing ratios of weight on drivers to tractive effort vary from about 4.5 to 5.5, reaching in some recent designs a value as high as 6.0. This is what might be expected in high speed locomotives where maximum tractive effort is relatively unimportant. The great weight imposed on the drivers by the unusually large boilers has re-

TABLE I.
General Data.

	4-4-2	4-6-2
Type	Passenger	Passenger
Service	Bit. coal	Bit. coal
Fuel	24,100 lbs.	31,100 lbs.
Tractive effort	196,000 lbs.	224,000 lbs.
Weight in working order	105,000 lbs.	145,000 lbs.
Weight on drivers	340,000 lbs.	371,000 lbs.
Weight of engine and tender in working order	7 ft.	13 ft. 4 in.
Wheel base, driving	27 ft. 7 in.	34 ft. 2 in.
Wheel base, total	58 ft. 2 in.	66 ft. 3 in.
Wheel base, engine and tender		
Ratios.		
Total weight ÷ tractive effort	8.14	7.20
Weight on drivers ÷ tractive effort	4.36	4.66
Tractive effort × diam. drivers ÷ heating surface	679	613
Total heating surface ÷ grate area	56.7	71.5
Firebox heating surface ÷ total heating surface, per cent.	6.42	5.33
Weight on drivers ÷ total heating surface	37.5	38.6
Total weight ÷ total heating surface	69.9	59.7
Volume both cylinders, cu. ft.	10.2	12.3
Total heating surface ÷ vol. cylinders	275.	350.
Grate area ÷ vol. cylinders	4.85	4.27
Cylinders.		
Kind	Simple	Simple
Diameter	20 in.	22 in.
Stroke	28 in.	28 in.
Valves, kind	Piston	Piston
Wheels.		
Driving, diameter over tire	79 in.	74 in.
Boiler.		
Working pressure	200 lbs.	200 lbs.
Outside diameter of first ring	70 in.	70 in.
Firebox, width and length	66 in. x 108 in.	70 in. x 108 in.
Tubes, number and diameter	315—2 in.	303—2 1/4 in.
Tubes, length	16 ft.	20 ft.
Heating surface, tubes	2,625 sq. ft.	3,550 sq. ft.
Heating surface, firebox	180 sq. ft.	200 sq. ft.
Heating surface, total	2,805 sq. ft.	3,750 sq. ft.
Grate area	49.5 sq. ft.	52.5 sq. ft.
Tender.		
Water capacity	7,000 gal.	7,000 gal.
Coal capacity	12 tons	15 tons

sulted incidentally in obtaining more adhesive weight than is actually needed in this class of service. This was not true of the earlier and lighter designs of the Atlantic type, in which it was occasionally found desirable to apply traction increasers.

Valve Gear.—The Stephenson link motion is still used by some railways, but with the increase in size of locomotives, it has become more and more difficult to find room for properly placing this gear. The eccentrics are crowded into small spaces and their inspection and maintenance is difficult. The Walschaert gear, due to these facts and to its inherently lighter construction, is rapidly displacing the Stephenson link motion.

Compounding and Superheating.—The American designer has followed with care the development, in foreign countries, of the four-cylinder balanced compound locomotive; but, while he has experimented in the use of this type of machine, it has, as yet, found no permanent place in the practice of this country. The use of superheater steam has greatly increased during the past two or three years, and in the near future will probably constitute one of the distinguishing characteristics of high speed passenger locomotives.

The foregoing discussion is based upon a study of about

thirty locomotives of the Atlantic and Pacific types built within the last six or seven years. In order to display other characteristics of these engines, Table 1, which gives detailed information about a representative of each type is here presented. The data for each of the locomotives given in this table is a composite of the dimensions of the corresponding types in the thirty locomotives above referred to. The figures in each class were obtained by taking the data for an actual locomotive and

closely compared with those of the locomotives which have been tested at the testing plants of Purdue University and the Pennsylvania Railroad. Such study has warranted the deductions concerning evaporation per square foot of heating surface and steam consumption per horse power, which appear in Table II. Other values for performance there given follow naturally from these two. Table II gives values for boiler and engine performance at 40 and 60 m. p. h. for both of the typical engines of

TABLE II.—PERFORMANCE OF TYPICAL HIGH SPEED LOCOMOTIVES.

Type.	Running Conditions.		Boiler Performance.				Power.			Water and Fuel Consumption (Lbs.).		
	Power (See Note 1).	Speed (Miles per Hour).	Equiv. Evap. per Hr. from and at 212° F.		Total Coal per Hour (See Note 2).	Total Evap. per Hr. from 60° F. to 200 Lbs. Press.	Indicated Horse Power.	Draw-bar H. P. Cylinder H. P. (See Note 3.)	Draw-bar Horse Power.	Steam per I.H.P. per Hr.	Coal per I.H.P. per Hr.	Coal per D.H.P. per Hr.
			Total (Lbs.).	Per Sq. Ft. Heating Surface (Lbs.).								
Atlantic.....	Max.	60	33,656	12	4,207	27,766	974	.62	604	28.5	4.32	6.97
	Avg.		25,242	9	2,602	20,825	744	.50	372	28.0	3.50	7.00
	Max.	40	33,656	12	4,207	27,766	1,133	.84	960	24.5	3.71	4.38
	Avg.		25,242	9	2,602	20,825	850	.79	670	24.5	3.06	3.87
Pacific.....	Max.	60	45,031	12	5,629	37,150	1,281	.69	884	29.0	4.39	6.37
	Avg.		33,773	9	3,482	27,863	978	.60	587	28.5	3.56	5.93
	Max.	40	45,031	12	5,629	37,150	1,486	.87	1,290	25.0	3.78	4.36
	Avg.		33,773	9	3,482	27,863	1,114	.83	925	25.0	3.13	3.76

Note 1—By maximum power is meant the maximum power which can be continuously maintained.

Note 2—It is assumed that the locomotives use bituminous coal having a heating value of approximately 14,000 B. t. u. and containing about 75 per cent. fixed carbon and approximately 15 per cent. of volatile matter.

Note 3—In this column is given the ratio of tender draw-bar horse power to cylinder horse power, under actual conditions of road operation.

TABLE III.—DATA CONCERNING HIGH SPEED PASSENGER TRAINS AND LOCOMOTIVES ON REPRESENTATIVE AMERICAN RAILWAYS.

Name of road.....	C. B. & Q.	Lehigh Valley	N. Y. N. H. & H.	Southern Pacific	Pennsylvania	New York Central & Hudson River
Designation of train.....	No. 15, Fast Mail	No. 9, Black Diamond Express	Merchant's Limited	No. 2, Overland Limited	No. 29, Pennsylvania Special	No. 51, Empire State Express
Termini of the run.....	Chicago-Union Pacific Transfer	New York-Buffalo	New York-Boston	San Francisco-Ogden	New York City-Chicago	New York-Buffalo
Length of run (miles).....	493.3	447.6	232	780	907.5	438.7
Schedule time (hrs., min.)..	11—0	10—13	5—0	25—58	17—55	8—44
Actual running time (hrs., min.).....	10—37	9—35	4—45	24—5	17—27	8—27
Number of stops.....	12	11	4	19	9	5
Average speed based on running time (m.p.h.).....	46.5	46.7	48.9	31.4	52.5	51.9
Weight of train (excluding engine and tender) (tons)	378	303	457	463	N. Y.-Altoona 321 Altoona-Pittsb. 253 Pittsb.-Chic. 316	350
Number of locomotives used.	3	3	1—Electric 2—Steam	6	6	3
Types of locomotives used..	Atlantic 1—Compound 2—Simple	Atlantic	Atlantic	Atlantic	Atlantic	Pacific

The above data apply to the whole run. The following apply to that division of the run (among those over 90 miles long) over which the train makes its greatest average running speed.

Name of the division.....	Chicago-Aurora	Buffalo	Shore Line	Salt Lake	Western Division Subdivision C	Mohawk	Western
Length of the division (miles)	162.5	176.6	95.4	539	130.6	147.7	148.0
Schedule time (hrs., min.)..	3—12	3—50	2—2	15—0	2—14	2—50	2—41
Actual running time (hrs., min.).....	3—2	3—44	1—54	14—12	2—14	2—47	2—38
Number of stops.....	1	2	2	10	0	1	1
Maximum grade (per cent.)..	0.8	0.4	0.8	1.43	0.5	1.63	.97
Maximum curvature (deg.)..	3.0	8.0	10.5	6	2.3	7.4	5.9
Average speed based on running time (m.p.h.).....	53.6	47.3	50.2	38.0	58.5	53.1	56.2
Weight of train (excluding engine and tender) (tons)	378	243	457	463	314 to 318	350	450
Types of locomotives used..	Atlantic-Comp.	Atlantic Simple	Atlantic Simple	Atlantic	Atlantic	Pacific	Pacific
Total weight of engine only (lbs.).....	183,000	183,300	200,000	196,000	183,000	266,000	266,000
Total weight of tender (lbs.)..	120,400	143,200	134,000	139,700	145,600	162,700	162,700
Weight on drivers (lbs.)....	95,900	95,300	105,500	105,000	118,350	171,500	171,500
Cylinder-diameter (in.)	15 and 25	20	21	20	20½	22	22
Cylinder-stroke (in.)	26	26	26	28	26	28	28
Diameter of drivers (in.)....	78	77	79	81	80	79	79
Total heating surface (sq. ft.)	2,990	2,870	3,221	2,649	2,640	4,231	4,231
Grate area (sq. ft.).....	44.1	67.7	54	49.5	55.5	56.5	56.5
Type of valve gear.....	Stephenson	Stephenson	Walschaert	Stephenson	Stephenson	Walschaert	Walschaert

slightly modifying some of the items by comparison with others of the same type. In neither case is the locomotive the largest of its type, but in its proportions and dimensions it is probably fairly representative of the type.

Engine and Boiler Performance.—Reliable results of but few tests of these types of locomotives are available. In order to arrive at some conclusions concerning their steam and fuel consumption, their dimensions and operating conditions have been

Table I. These values, it is believed, may be taken as a prediction of what may reasonably be expected, in normal operation, of these types of high speed locomotives.

Train Operation.—Table III gives in summarized form, information concerning seven first class passenger trains now running in daily service on six representative American railways. The information there given was furnished by the officers of these roads and is here included by their courtesy.

THE CANAL AND TRANSCONTINENTAL TRAFFIC II*

Rates to and From Interior, Probable Future Adjustment,
and Relation to Questions of Tolls and Boat Ownership.

BY EMORY R. JOHNSON,
Special Commissioner on Panama Canal Traffic and Tolls.

TRANSCONTINENTAL RATES TO AND FROM INTERIOR POINTS: EFFECT OF WATER COMPETITION.

The steamship lines now engaged in the coast-to-coast business obtain a part of their freight from interior points in the eastern states for shipment to the Pacific coast. The manifests of cargo show that a small tonnage is obtained from places as far west as Chicago and St. Louis, and also state that some of the westbound freight shipped by water is destined to interior points in the western part of the United States. The great bulk of westbound freight, however, originates at the eastern terminal of the water lines—at New York and points not far distant therefrom—and is destined to the Pacific coast terminals and to places not far inland. The evidence secured by the Interstate Commerce Commission in the Spokane and other cases led the commission to state that "The principal movement by water is from the Atlantic seaboard itself, from New York and from points having water communication with New York, and from interior territory immediately contiguous. There is a considerable movement as far inland as Buffalo and Pittsburgh, and an occasional movement from Detroit, Chicago, and similar points. A movement of starch from Cedar Rapids, Ia., of considerable proportions was shown, but generally speaking, up to the present time, comparatively little traffic originating west of the Buffalo-Pittsburgh zone has reached the Pacific coast by water."¹ The present eastbound freight of the steamship lines, to a larger degree than is true of their westbound tonnage, originates and terminates near the seaboard.

The competition of the intercoastal water lines with the railways has benefited the sections near the Atlantic and Pacific seaboard more than the interior section; because, for most shipments to and from interior points via a combined rail and water route, the through rate is the sum of the rail rate to or from the coast and the rate by water from coast to coast. There are also transshipment or rehandling charges.

The Panama Railroad Steamship Line, which makes the westbound rates applying over its line and Pacific coast connections, deals as follows with charges from interior eastern points. From its New York pier to Pacific coast points the following "minimum rates" apply:

	Per 100 lbs.
To East San Pedro, Cal.....	\$0.50
To Los Angeles, Cal.....	.55
To Oakland, Cal.....	.50
To Portland, Ore.....	.52½
To Sacramento, Cal.....	.55
To Stockton, Cal.....	.55
To all other Pacific coast ports.....	.60

The tariff then provides that, except in case of special rates from New York pier or of rates which do not exceed the above minima, the water rates quoted "may apply from interior points, and when a rate is at least 20 cents higher than the minimum, the Panama Railroad Company will assume the charges from shipping point to New York pier not exceeding 20 cents per 100 lbs., any excess over this absorption to be shown on bill of lading as 'advance charges' to be paid by shippers or consignees as the case may be. When a freight rate is not at least 20 cents higher than the minimum, the Panama Railroad Company will assume the difference between the minimum and said rate." When the water rate on the commodity in question does not ex-

ceed the theoretical minimum water rate by 20 cents, the Panama Railroad Company absorbs the rail rate only to the extent of the excess of the actual water rate over the minimum water rate, and if the actual rate is only equal to, or is less than, the minimum, the shipper or consignee is obliged to pay the entire rail charge from the inland point to New York.

The policy of the American-Hawaiian Steamship Company is to "make its rates from the terminals."¹ It does not absorb any of the rail rates to New York; but as the rates of this company are not published it is probable that traffic of large shippers from interior points is solicited at such rates from New York to the Pacific coast as to allow the inland shippers to pay the rail charges to New York and yet enjoy a favorable through rail-and-water rate.

At the Pacific destination of westbound traffic the Panama Line and connections absorb the rates to certain points not on the coast. The tariffs apply alike to the following points: San Francisco, Sacramento, Stockton, Oakland, Berkeley, Los Angeles, San Diego, Santa Barbara, San Pedro, Redondo, Vancouver, Portland, Astoria, Seattle, Tacoma, Port Townsend, Everett, Anacortes, New Whatcom and Victoria. As is shown above, different minima water rates prevail from the Atlantic seaboard to these points on or near the Pacific coast; but upon any particular commodity the same actual rates are quoted from New York to all the above-named Pacific destinations. The actual rate on any given article shipped from an interior point near the Atlantic via New York to any one of the Pacific destinations will depend both upon the amount of rail charge from the interior point to the Atlantic seaboard absorbed by the steamship lines and also upon the minimum water rate from New York to the Pacific destination. The minimum bill of lading for single shipments, likewise, varies from \$2 to \$2.75. The American-Hawaiian Line does not absorb the rail rates from the Pacific coast terminals to any interior destinations. Since no interior rates beyond Sacramento and Stockton are absorbed by any line, most of the traffic that reaches the west coast by water does not go far inland, although some freight is carried to points as distant as Reno, Nev.

The Sunset-Gulf Line from New York to the Pacific coast takes traffic from interior eastern points via New York and New Orleans or Galveston at through rates equal to the all-rail rate from the interior eastern points to the Pacific coast. It thus absorbs the rail rate to New York in that the rate is paid out of the through charge. The Sunset-Gulf route, however, is to be classed with the transcontinental rail lines, and not with the intercoastal water lines—because its rates are the same as those by the all-rail carriers.

Neither the trunk line nor the transcontinental railways have favored the shipment of commodities from the Middle West to the Atlantic seaboard for carriage thence by water to the Pacific coast. The policy of the railways, generally, under the leadership of the western lines, has been to hold to the all-rail lines the traffic to the Pacific coast both from the Atlantic seaboard and from interior points.

The rivalry of the railways from the Central West to the Atlantic with those from the Central West to the Pacific, and the industrial competition of the Mississippi Valley with the Eastern States, which can ship to the Pacific coast by water lines, brought about the system of blanket rates for most of the

*Abstracted from Prof. Johnson's official report on "Relations of Panama Canal to Traffic and Rates of American Railroads." An abstract of an earlier part of the report was published August 2, page 199.

¹City of Spokane et al. v. Northern Pacific Railway Company et al., 21 I. C. C. Reps., 420.

¹G. S. Dearborn. Testimony, January 24, 1912, in Hearings on Panama Canal by House Committee on Interstate and Foreign Commerce.

traffic to the west coast from the entire section east of the Missouri. The competition of the rail and water lines at the Atlantic seaboard controlled transcontinental rail rates from the Eastern States, and the railways and the industries of the Middle West insisted upon reaching the Pacific coast on equal terms with the railways and industries of the eastern section. Upon some articles the rates from the Central West are lower than from the Atlantic seaboard, there being some grading downward of rates by successive lettered groups westward from the Atlantic coast.

The effect of water shipments upon the interior has been indirect rather than direct. The tonnage of transcontinental traffic carried from the Mississippi Valley to the Atlantic seaboard for shipment thence by water to the west coast has been relatively small, but the actual or possible shipment of a relatively large volume of commodities by water from the Atlantic coast has controlled the rail rate from the Central West to the Pacific. Water competition has exercised less influence upon eastbound rail rates from the western section of the Middle West and the East, but even on eastbound traffic most rates are blanketed over the entire region east of the Missouri river. There is more grading by distance of eastbound than of westbound rates, but the difference between the eastbound and westbound transcontinental rate systems is one of degree not of kind or of principle.

PROBABLE ADJUSTMENT OF TRANSCONTINENTAL RAIL RATES RESULTING FROM CANAL COMPETITION.

The opening of the Panama Canal will so greatly change the industrial relations of different sections of the United States and the competition of the transcontinental railways and the intercoastal water lines as inevitably to require many changes in the present system of transcontinental rates.

1. The railway rates most completely subject to the competition of the intercoastal lines using the canal will be those westbound to the Pacific coast from the section of the United States between the Buffalo-Pittsburgh district and the Atlantic seaboard. Even under present conditions, the transcontinental rail rates between the two seaboards are largely affected by the competition of the routes via the Isthmuses of Panama and Tehuantepec, and it is estimated that one-half of the traffic carried from this eastern section of the United States to the Pacific coast now moves by the water routes. Is it probable that the railways will endeavor to meet the rates of the intercoastal water lines with the view to holding to the all-rail routes the traffic between the two seaboards? It is hardly to be expected, for the following reasons, that the railways will make a desperate effort to hold this traffic against the water lines.

In the first place, the tonnage involved constitutes, at the present time, a comparatively small percentage—only 20 to 22 per cent.—of the total traffic carried to the Pacific coast by the transcontinental roads—those running from Chicago to the west coast. Only 35 per cent. of the through business of these lines originates in this eastern section and in the Buffalo-Pittsburgh territory. In other words, more than two-thirds of the through traffic of the transcontinental lines now comes from the Central West.

In the second place, the system of blanketing rates from the Atlantic seaboard westward to the Missouri river—a system that will probably prevail—will carry through to the Missouri river at any rate reductions which the railway lines may make on traffic from coast to coast, and it is hardly to be expected that the railways will reduce rates unnecessarily upon two-thirds to four-fifths of their traffic in order to compete more successfully for the remaining minor portion of their possible tonnage. It will be more profitable for the transcontinental rail lines to lose the major portion of their traffic from the Atlantic seaboard section in order to maintain paying rates on the westbound traffic from the middle section of the United States.

In the third place, it is probable that the eastern trunk lines

as well as the Pacific lines originating at Chicago and central western points will be opposed to the policy of reducing coast-to-coast all-rail rates to the lowest possible minimum in order to meet the competition of the water lines. It will be to the advantage of the eastern trunk lines to haul traffic from points within 500 miles of the Atlantic to the seaboard for shipment by water rather than to prorate with their western connections low, through all-rail rates from the Atlantic to the Pacific.

2. The transcontinental railways may be expected to endeavor to hold as much as possible of the traffic from the eastern seaboard states to intermediate points in the Rocky Mountain states. The steamship lines through the canal, with the co-operation of the Pacific coast jobbers, will endeavor to supply the cities within a thousand miles of the Pacific coast with supplies handled by way of the canal and the Pacific gateways. The railways will be obliged to decide whether it is wiser to continue to favor the Pacific coast jobbing trade, or, by reduction of rates from the East to the intermountain cities, to cause those cities to secure their supplies directly from the East and not by way of the Pacific. While it is impossible to predict which of these two policies will be deemed wiser, it would seem a priori that the railways will prefer to supply the intermountain states directly from the eastern sources of supply.

3. The principal eastern termini of the transcontinental railways are St. Paul, Duluth, Chicago, St. Louis, Kansas City and Omaha, and these railways are concerned first of all with the effect which the Panama Canal may have upon the westbound rates from the central section of the country. The rates to the Pacific coast from Chicago and other points as far east as that city, after the opening of the Panama Canal, must meet the through rates by rail-and-water lines via Atlantic and Gulf ports. It is the expectation of the trunk lines that they will be able to divert to the Atlantic seaports transcontinental traffic originating at points as far west as Cleveland and Indianapolis. It will also probably be possible for the railways to the Gulf to attract some westbound transcontinental traffic to Gulf ports from points as far north as St. Louis. This indicates that the transcontinental lines must reckon with the canal route in making rates from the eastern and southern parts of the Mississippi valley to the Pacific coast.

4. At the present time the transcontinental railways have a relatively large and a highly profitable traffic from the Central West to intermediate points in the mountain states. The rates generally being the same from the Middle West as from the Atlantic seaboard to the states in the intermountain section of the Far West, the manufacturers and other producers of the Middle West have secured most of the trade of the mountain states. Formerly traffic moved from the Atlantic seaboard around to the Pacific coast and from there inland to the intermountain states. Now it moves mainly by direct rail haul from the Middle West. With the opening of the Panama Canal, an effort will doubtless be made by eastern producers to regain a greater or less portion of the trade of the intermountain states by shipping commodities at low rates through the canal to the Pacific coast for distribution, thence through the intermountain states. The Pacific coast jobbers interested in this trade will be able to secure commodities either from eastern producers by way of the canal or from Middle West producers by way of the railways. It has thus far been deemed profitable by the transcontinental lines to make through rates to the Pacific coast much lower than to intermediate points and thus favor the jobbing trade of the Pacific coast. This policy has been justified by the fact that the low through rates were, at least, slightly profitable, and that the distribution of traffic by rail from the Pacific coast through the mountains at high local rates was highly profitable. It seems probable that the Panama Canal will cause the through rates to the Pacific coast to be so low as to make it more profitable for the railways to carry traffic from the Middle West directly to intermediate points than to haul it to the Pacific coast for subsequent distribution. This view has

been expressed in the following words by the traffic manager of one of the transcontinental railways:

The railways have maintained normal rates to these interior points and have resisted the natural demand for rates insuring direct movement of these commodities from eastern sources of supply, because they knew that they were carrying 85 per cent. of the tonnage to Pacific coast terminals, and for that reason their revenue on eastern manufactured goods shipped from Seattle to Walla Walla, Spokane, etc., was not measured by the rate charged for that final movement of the traffic, and so far as the competition of water-borne commodities, including imported merchandise, was concerned, there was consolation in the fact that we were getting a comparatively high rate from Seattle to these interior points.

But we should ask ourselves, what would have been the adjustment of rates to interior points in the absence of these compensating conditions? If the town of Walla Walla uses 10,000 kegs of nails per annum, it is the duty of the railway traffic manager to make that business contribute as much as possible to the earnings of his railway. Heretofore we have not worried when we saw these nails coming in from Portland or Seattle, for the reasons above stated, but when we stop carrying the original shipments to Seattle, and when the business from Portland begins to seek the open river route, then we will realize that we must make rates from the East which will insure the direct movement of these commodities to these interior points.

As to the ability of the railways to do this, I don't see how there can be any question so far as the territory east of the Cascade mountains is concerned; they may be driven out of the Pacific coast business, but they will stay in the business east of the Cascade mountains, because they must stay in it so long as it represents any rate over and above the actual cost of the service when considered as additional traffic within the capacity of the railway, and that is just exactly what it will be.

5. The tonnage carried by rail from the Pacific coast through to the Atlantic section east of Pittsburgh and Buffalo is relatively light and consists, in large part, of perishable freight, of which green fruits constitute an important item. It is possible that the steamship lines through the Canal will handle some of the green fruits from the west coast to the eastern markets, but in all probability the present methods of shipping and marketing fruit will prevail, and the traffic, in spite of somewhat higher rates, will continue to move mainly by rail. The principal markets for all the products of the west coast are in the Rocky Mountain section and the Mississippi Valley, and the transcontinental railways will be concerned chiefly in maintaining eastbound rates from the west coast to those sections and will hardly decide to reduce rates on traffic destined to points throughout the eastern half of the United States in order to hold against the steamship lines a portion of the comparatively small tonnage which the railways haul through from the Pacific to the Atlantic seaboard section.

6. The rates on fruits, barley, fish, lumber and other west coast products to the mountain states and to the Mississippi Valley are of prime importance to the transcontinental railways. The traffic taken from the west coast by rail to the southern and eastern portions of the Mississippi Valley must be secured in competition with the combined water and rail routes by way of Panama and the Gulf or Atlantic ports, but for the major share of the eastbound traffic from the Pacific coast over the mountains the railroads will not be seriously affected by canal competition.

7. The traffic from the mines and ranches of the intermountain states eastbound to the Atlantic coast section comprises a comparatively small tonnage. The rail rates on wool and some other products will, after the opening of the canal, necessarily be influenced by the through rate by rail to the Pacific coast and on by steamship lines through the canal. It is not probable, however, that much traffic will move from points east of the

Sierra Nevadas to the Pacific coast for transshipment eastbound through the canal.

8. The principal markets for the productions of the Rocky Mountain states are in the Mississippi Valley. It will not be possible for the canal to divert from the railways the traffic from the western mountain states to destinations west of Buffalo and Pittsburgh, nor will the canal have much effect upon the rates which the railways may charge for this traffic.

9. The general effect of the canal will be to lower transcontinental railway rates. If the foregoing analysis proves to be sound, it will be the policy of the railways to allow a portion of the traffic that might be held to the rails to be shipped coastwise through the canal and to maintain rates upon the traffic which can readily be prevented from taking the canal route. It is probable that the railways will adopt the general policy of surrendering without serious struggle the minor portion of their traffic in order to maintain profitable charges upon the major share of their tonnage. The immediate effect of the canal will be to lessen railway profits; the ultimate effect may be the enhancement of the prosperity of the railways. The canal will aid the industries and trade of the United States. Like other transportation facilities, it will create the need of other means of transportation; and, should the transcontinental railways be obliged to face reduced profits for a period of years, they need have no serious apprehension as to their future prosperity. The railways connecting the Mississippi Valley and the Pacific coast are among the most profitable lines in the United States. The country they serve is certain to have a large development during the next quarter century, a development that will unquestionably be appreciably aided by the Panama Canal.

SUMMARY OF THE PROBABLE EFFECTS OF THE PANAMA CANAL UPON TRANSCONTINENTAL TRAFFIC AND RATES.

The probable influence of the Panama Canal upon the trade of the eastern and of the central sections of the United States with the western part of the country, and the anticipated effects of the canal upon the carriers interested in that trade may be broadly summarized as follows:

1. The Atlantic section of the United States will obtain a somewhat larger share of the trade of the Pacific coast, and will secure more benefit from the cheap water route than will the Middle West.

2. The inroads upon the trade now possessed by the middle section of the country will, however, probably not be serious; because (a) the Middle West now has a firmly established hold upon the west coast trade; (b) the Middle West producers, aided by their rail carriers to the Pacific coast, will probably be able to compete successfully with eastern producers not located in or near the Atlantic ports. The Middle West will lose a part but not all of the trade of the Pacific coast seaboard cities, but may be expected to hold nearly all of the trade of the cities in the intermountain states; (c) the trunk lines to the Atlantic seaboard will doubtless aid producers just west of the Alleghenies by making low through rates from places as far west as Cleveland and Indianapolis to the Pacific via the Atlantic ports and the canal. The rail lines to the Gulf likewise will draw trade from Memphis and St. Louis and possibly Kansas City to the Gulf for shipment through the canal to the Pacific coast; (d) the transcontinental rail lines running west from St. Paul, Chicago, St. Louis and the cities of the Missouri river may be expected to assist in building up the direct trade from the Mississippi and Missouri Valleys to the cities in the intermountain states, and thus to limit the entry of goods from the eastern part of the United States via the Pacific coast into the inland markets of the intermountain states.

The intermountain states will probably secure lower freight rates for their trade with the eastern section of the country and with the Middle West. Instead of cutting deeply into the rates between the eastern part of the United States and the Pacific coast terminals, and thereby, under the ruling of the Interstate

Commerce Commission in the Spokane and Reno cases, automatically depressing all rates to intermediate points, the railways will more probably decide to maintain fairly remunerative through rates to the west coast, to suffer the major share of the coast-to-coast traffic to be supplied by eastern producers and to be carried through the canal, and to make only such reductions in the rates to and from the intermountain territory as may be required to cause that section to continue to trade mainly with the Middle West.

3. The canal will assist the Pacific coast states in trading with the eastern and southern parts of the United States. Much trade not now possible will develop. The importance of the west coast cities as jobbing centers may be lessened by the growth of direct trade between the intermountain states and the sections east of the mountains, but this loss will be more than compensated for by the growth of new trade.

4. The effects of the canal upon American trade and upon rail rates will not be much affected by the exemption of coastwise ships from the payment of Panama tolls. If the non-payment of tolls were to reduce freight rates by the amount of tolls, the freight rates—which will be from \$6 to \$20 a ton—might possibly be 60 cents a ton lower. That would be of some

that the payment of tolls by ships engaged in our coast-to-coast trade would affect neither the rates of the regular steamship lines nor the charges of the transcontinental railways.

WEST SHORE WEEHAWKEN TUNNEL VENTILATION.

The West Shore has recently installed a Churchill system of ventilation at the west portal of the Weehawken tunnel, through the palisades between Weehawken and New Durham, N. J. The tunnel is a double track bore 4,225 ft. long and has a cross section of 507 sq. ft.. The width is 27 ft. and the height above the base of rail 19 ft 6 in. All of the freight and passenger traffic of the West Shore and New York, Ontario & Western railways passes through this tunnel. This traffic had become so dense that the tunnel was practically never free from smoke. The result has been that aside from the annoyance to train crews and passengers resulting from the fouled condition of the atmosphere, innumerable delays resulted from the inability of the engine men to see the signals. These conditions have been growing gradually



Ventilating Plant at West Portal of Weehawken Tunnel.

assistance to the Pacific coast jobbers and large shippers, and would somewhat increase the advantage which the canal will give the East over the Middle West in trading with the west coast. It is not probable, however, that the exemption of the payment of tolls will appreciably affect the rates charged by the regular steamship lines. The non-payment or remission of tolls will chiefly aid the owners of the coastwise marine and not the shippers. Most traffic will be handled by the regular lines which will charge common rates fixed in conference, and competition, while not eliminated, will be so regulated as to enable the carriers to keep charges well above the lowest rates at which traffic can profitably be carried. Whether there be tolls or no tolls, the line steamship rates will not be based on cost of service, but will be such as the traffic will bear and increase. Canal tolls, being a part of the cost of service, will not make line steamship rates higher, nor will the omission of tolls cause the freight rates to be lower. This is not true of the rates payable on bulk cargoes of traffic handled in individual vessels operated under charters. Charter rates are competitive, and the few large shippers who can use a chartered vessel will be benefited by being relieved of the payment of canal tolls. It is probable

worse, until it was decided that some system of ventilation was needed and the Churchill was finally selected.

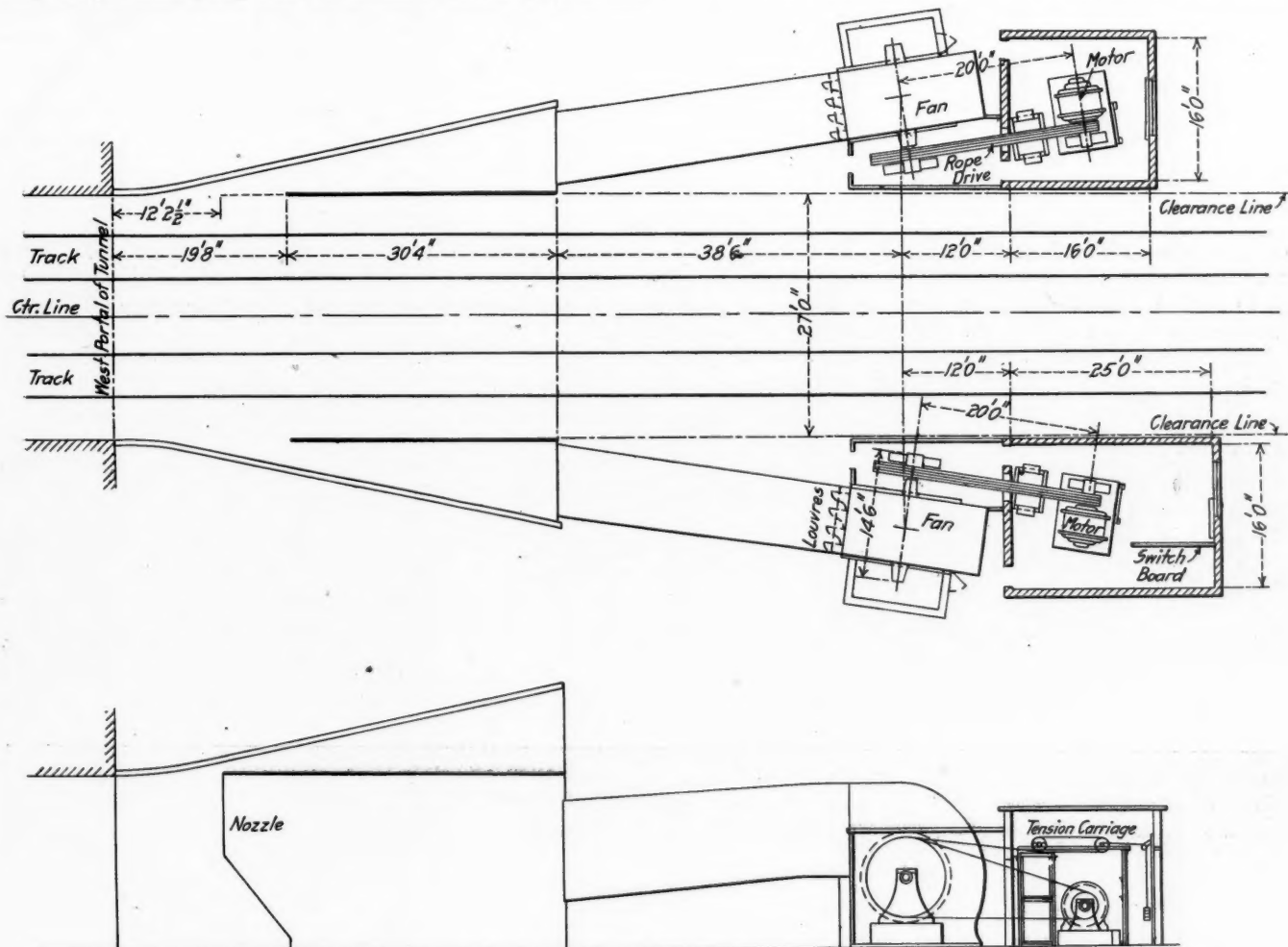
The principle of this method is to surround the tunnel portal with a nozzle, through which, air is blown into it. This entering air acting on the principle of an exhaust nozzle of a locomotive, entrains the air with which it comes in contact and creates a draft through the tunnel, carrying the smoke and foul air with it. This system of ventilation was first applied to the Elkhorn, W. Va., tunnel of the Norfolk & Western, of which Mr. Churchill is chief engineer, and where it was eminently successful. A full description of this installation was published in the *Railroad Gazette* for May 10, 1901.

The West Shore tunnel contains about 2,142,000 cu. ft. of air and two fans have been installed, each with a capacity of 275,000 cu. ft. of air per minute, or 550,000 cu. ft. for the two. This latter volume of air is delivered under a pressure of 1¼ oz. at the discharge orifice of tunnel nozzle when the two fan sets are operating together. Under normal working conditions the tunnel will be cleared of smoke and gas in from 4 to 5 minutes, so that the induced current has a velocity

through the section of from 10 to 12 miles per hour. This time, however, varies with atmospheric conditions, and damp, murky weather or a strong east wind blowing in at the east portal may have such a checking effect on the speed of the air that the time of clearing may be extended to from 10 to 12 or even 15 minutes.

At the Elkhorn tunnel on the Norfolk & Western there is an adverse grade in the direction of the flow of air, and it is customary to run the trains slower than the current, so that all smoke is swept on ahead of the locomotives and the engineman is at all times working in a clear atmosphere. When running in the opposite direction this is of course also the case. In the West Shore tunnel where the adverse grade is only 0.3 per cent. going west no attention will be paid to this

of 158 r. p. m., while the motors run at 600 r. p. m., the diameters of the two pulleys being 114 in. and 30 in., respectively. The outside diameter of the fans is 132 in. and the width of the blades at the periphery is 66 in. They deliver directly into air ducts leading to the nozzle, taking air through an inlet 134 in. in diameter and delivering through an outlet measuring 93 in. x 88 in. The weight of each fan in working order without motor, duct or sheave, is about 14,000 lbs. The overall width parallel to the shaft is 14 ft. 4 in. Each fan is enclosed in a heavy circular steel plate casing, and at the lowest part of the same there is a connection to the sewer so constructed as to avoid any leakage of air. The casing is also provided with an air-tight door, giving easy access to the interior. Each fan shaft, which is 6 in. in diameter, is provided



Plan of Tunnel Portal, Showing Location of Fans and Nozzles, with Elevation of One Fan and Nozzle.

in the movement and operation of trains. Ordinarily a train will run through in about two minutes and will, therefore, run ahead of the smoke, and as the grade is favorable in the direction of the smoke movement there will be no danger of stalling in a bad atmosphere. In the opposite direction the locomotive runs against the current and is in clear air all of the time except as it happens to meet a train. The tunnel forms one block in the signal system so that there is no danger of a train being stopped with the engine in the tunnel though the cars may be, as the signal posts are close to the portals at each end.

The fans are located about 100 ft. outside the west portal of the tunnel and on either side of the tracks in small buildings of reinforced concrete. The ducts between the fan housings and the nozzle are also to be constructed of reinforced concrete.

Each fan is driven by a rope drive leading from a pulley on the armature shaft of the motor. They revolve at a speed

with three bearings each of which has a length of four diameters.

The capacity of the fans is measured by Pitot tubes inserted in the ducts between the fans and the nozzles, which are in the straight section of the discharge.

The guaranteed efficiency of the fans is as follows:

Cubic feet of air per minute.	Air pressure at discharge orifice of tunnel nozzle in oz. per sq. in.	Revolutions per minute.	Brake H. P. at each fan pulley.	Mechanical efficiency of fan.
ONLY ONE FAN UNIT RUNNING.				
68,750	....	38	...	.....
137,500	.10	75	30	45 per cent.
275,000	.35	145	215	50 per cent.
TWO FAN UNITS RUNNING.				
137,500	....	38	...	.....
275,000	0.35	75	35	45 per cent.
550,000	1.35	150	220	50 per cent.

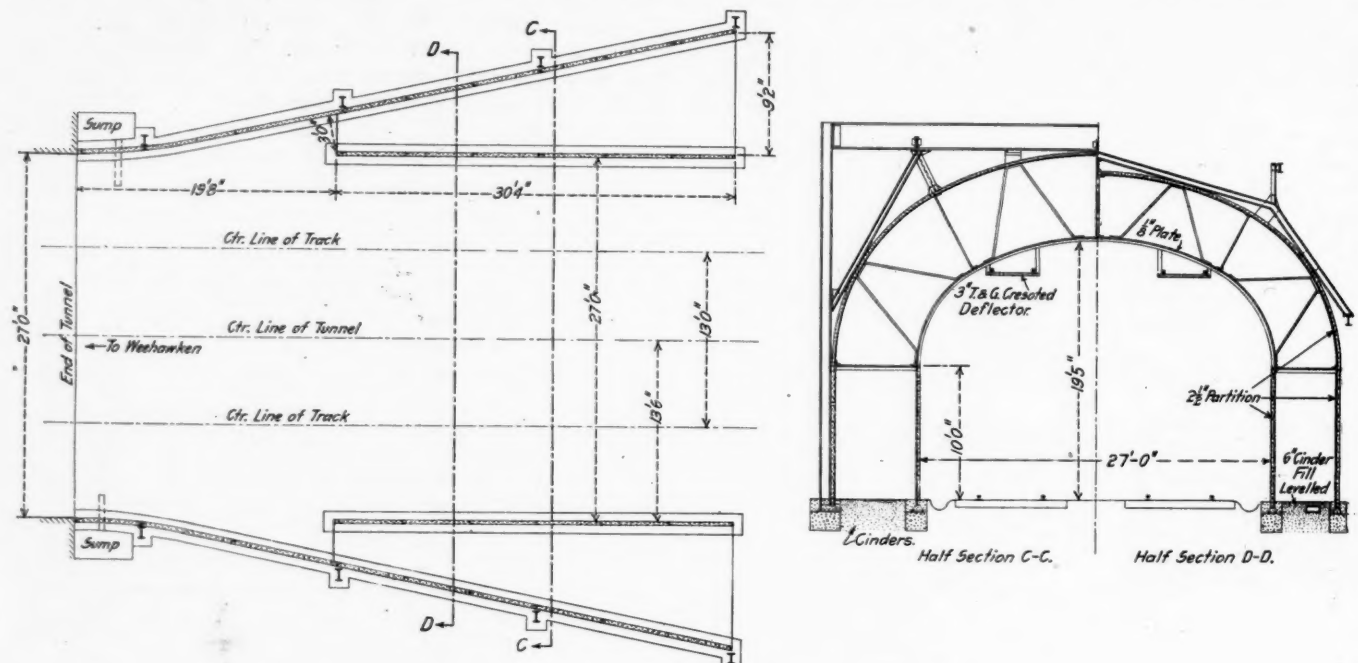
In operation the fans run smoothly and without vibration.

One fan is worked under full and the other under reduced speed for the greater part of the time, the two being driven together under full speed during the rush travel of the morning and evening hours.

The motors driving the fans obtain their current from the West Shore power plant at Weehawken. One motor is provided for each fan as shown on the plan. Each is of the slip

while the maximum running torque is approximately 200 per cent. of the full load torque.

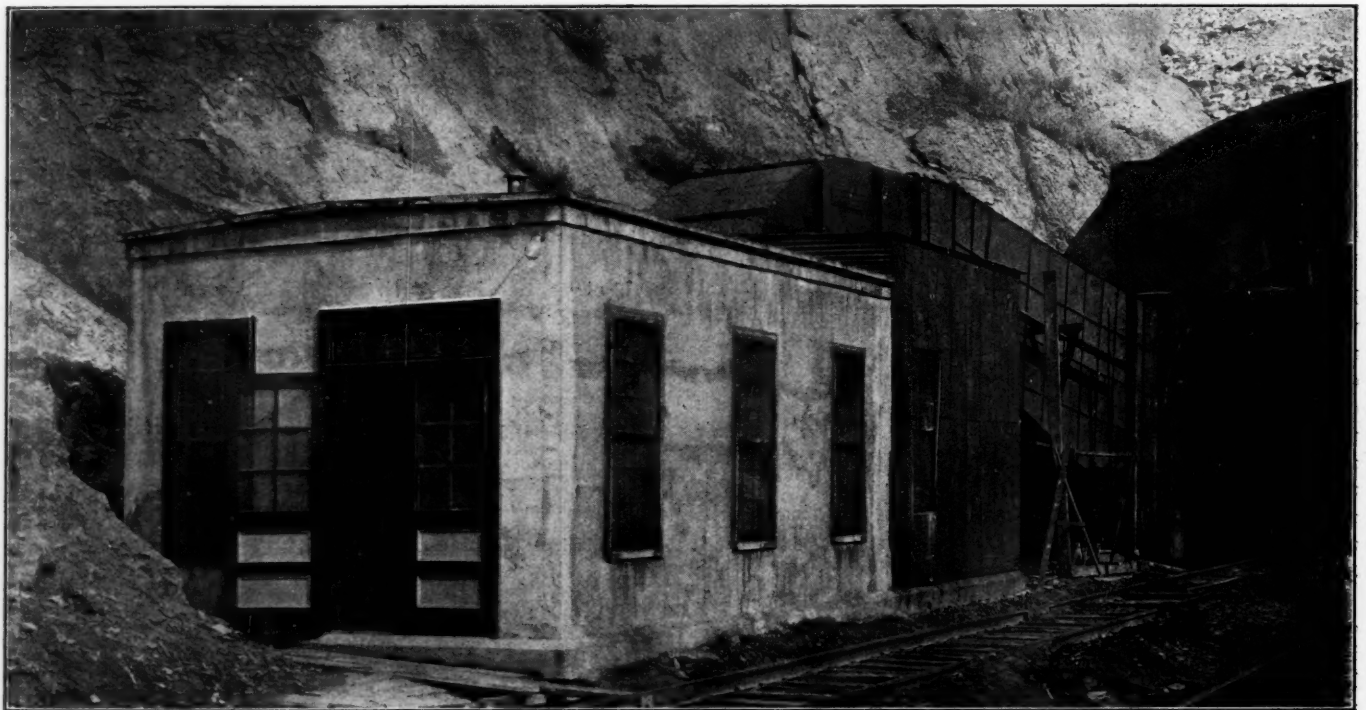
The ducts are of black sheet iron made smooth on the inside and fastened to a framework of rolled steel sections. They are covered with cement mortar reinforced with hy-rib. Each fan is provided with a valve located near the fan so that either fan may be shut down without appreciable leakage.



Detail of Nozzle Surrounding Tunnel Section.

ring, three-phase, 60-cycle, 2080-volt induction type, commercially rated at 250 h. p. when running at full load. The motors can be run at variable speeds, and are required to deliver a full load torque continuously down to one-half synchronous speed, operating satisfactorily under all load conditions from one-third to full synchronous speed. The starting torque is about 150 per cent. of the full load torque,

The nozzle contracts at the point of discharge where it has a width of about 18 in. and a total area of 90 sq. ft. From this it appears that when working at full capacity the issuing velocity of the air is something more than 100 ft. per second. The cross section shows the general form of the ducts and nozzle which surround the tunnel down to the springing line of the arch, tapering gradually from the fan to the tunnel.



One Fan Building and Air Duct.

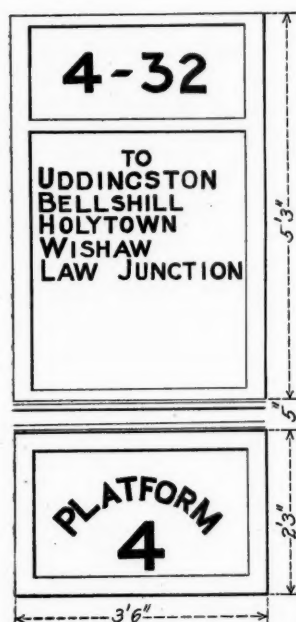
This system was installed under the direction of George W. Kittredge, chief engineer; J. W. Pfau, engineer of construction, and R. E. Dougherty, district engineer of the New York Central; Chas. E. Churchill was consulting engineer; Watson-Flagg Engineering Company contractors for fan houses, ducts and mechanical equipment; F. J. McCain Construction Company, contractors for erection of nozzle.

TRAIN BULLETINS, GLASGOW CENTRAL STATION.

In the great train shed of the Caledonian Railway at Glasgow, Scotland, placards announcing the departing trains are posted, a reasonable time before the train is to start, in a conspicuous central position where notice of all of the trains for, say, the next 20 or 30 minutes, can be seen at a glance; and printed in large enough letters to be read at a distance of 50 ft. and more.

These placards are displayed in a row of windows, the bottoms of which are 10 or 12 ft. above the floor. A view of these windows, taken at a time when four trains were posted, is given in large halftone engraving shown herewith.

These windows are in the front of a two-story frame building, within the train shed, called the "train information office." This structure is at the right, as one enters from the street and proceeds towards the train platforms, so that "he who runs may read." There are thirteen platforms in the station; and at the train information office a separate window is provided for each platform; and the placard shows the principal stations at which the train leaving that particular platform will stop.



Train Bulletin.

Usually the placard for a train is not exhibited in the window until the cars comprising the train have been brought to

the platform. In the working of the station the arrangement is to try and bring each train into the same platform each day, but this is not always possible, and therefore some of the placards have to be withheld until the vehicles have actually been placed. In the case of the London trains, the placards are usually exhibited fully half an hour prior to the time of departure.

For the Cathcart Circle trains there is always a placard exhibited, usually the placard indicating the 10-minute service; but aside from this at certain times of the day there may be no placard in sight. At certain hours the windows are all occupied.

Inside the train information office one man attends to the posting up of all the placards in the windows for departing and arriving trains. At the left of the placard windows, there is a series of boards with printed letters used to indicate the platforms at which incoming trains will arrive; and also the time that the train is due to arrive. Underneath the windows (below numbers 1, 2 and 3) a small blackboard is provided on which is indicated, by chalk, how certain long distance trains are running, whether on time or the number of minutes late. Special trains are announced on a large blackboard beside the notice board, at the left of window No. 1, and the announcements are made by writing with chalk.

Inside the general waiting room, in the train information building, the entrance to which is at the right hand side of the photograph, the whole wall space is covered by the company's time table boards.

The placards, which stand on the floor, leaning against the wall of the information office, are announcements of special excursions.

A sample placard is illustrated in our smaller engraving. The board bearing the platform number is fixed, while the others are removable.

For the foregoing information we are indebted to D. A. Matheson, general manager of the Caledonian Railway.

The Portuguese chamber of deputies has finally approved without opposition the contract entered into between the Portuguese government and the British Central Africa Company for constructing a railway through Portuguese territory from the Zambezi to Port Herald, the present terminus of the Shire Highlands railway in British Nyasaland. The line will be about 70 miles long and will have a 3-ft. 6-in. gage. It will run along the bank of the Shire river and touch the Zambezi at Kaia.



"Main Information Office," Central Station; Caledonian Railway, Glasgow, Scotland.

COMPARATIVE SUMMARY OF FREIGHT CARS IN SERVICE.

The tables on the immediate following pages show the number of freight cars in service on all of the important railways of the country in 1910 and 1911, and in 1900 and 1911. The figures are compiled by a railway officer to whom we are indebted for the opportunity of publishing them. It will be noted that narrow gage cars are excluded as well as non-revenue cars, but that company freight cars are included. The railways are grouped under the heads of New England roads, trunk line roads, Southern classification roads, Central classification roads and Western classification roads.

The table shows the number of cars in service, number of cars per mile of road, average length of haul, freight cars per thousand freight car miles and per thousand ton miles, the average rate per ton per mile and the freight cars in service per thousand dollars of freight earnings.

INEQUALITIES IN MAIL PAY.

Ralph Peters and E. G. Buckland, representing the committee of the railways on the subject of pay for mail transportation, have protested to President Taft against the provision in the pending post office appropriation bill relating to the proposed parcels-post system.

As an example of the present situation Mr. Buckland says that the New York, New Haven & Hartford, the Boston & Maine and the Maine Central, are losing \$311,386 a year carrying the mails. The postmaster-general says the railways should be permitted to make 6 per cent. on the cost of performing the service. On this basis, these three roads are losing nearly \$100,000 more than the sum named. The roads contend that the amount is more than that admitted by the postmaster-general, because he does not allow them anything for overhead charges, for the cost of the mail cars and the proportionate cost of tracks, stations, etc.

It is now proposed to add parcels post, and to pay nothing for it until the weighing period next after the law goes into effect. Until recently it was supposed that roads had some standing to collect from the government a reasonable price for work which they performed, but Mr. Buckland calls attention to the fact that the United States Supreme Court on June 7 last decided, in the case of the Atchison, Topeka & Santa Fe, that when a railway undertakes to carry the mail it must not only give all the service required by law, but also all additional service required by the postmaster-general, and that for such service it can only receive what Congress has authorized. A railway, said the court, was not bound to carry the mails, but if it did carry them, it must take what Congress offered.

Mr. Buckland believes that the rate should not be fixed by Congress, but should be determined by the Interstate Commerce Commission. Then it would be matter of indifference whether express matter were carried parcels post in the mail or by express.

The Bagdad Railway, Asia Minor, is being built toward Bagdad via Mosul, and has been completed almost to Djarabul, northeast of Aleppo on the Euphrates river. A corps of engineers is also at work along the intended route between Djarabul and Mosul, and from there to Bagdad and Basra. It is expected to have trains running through Aleppo to Constantinople before the end of three years, the delay being caused by the construction of the tunnel at Baghché. With trains running to each end of the tunnel, and a rapid carriage service connecting the two ends around the mountain, within a few months it may be possible to travel between Constantinople and Aleppo, making the trip in about two days.

COMPARATIVE SUMMARY OF FREIGHT CARS IN SERVICE ON RAILWAYS OF THE UNITED STATES—1910 AND 1911.

Note:— Narrow gage cars excluded. Non-revenue cars excluded. Company freight included.	Miles.		Frt. Equipment.		In-crease.	De-crease.	Per cent. change.		Frt. cars per mile of road.		Average length of haul.	Per 1,000 rev. ton miles.		Rate per ton mile. (Dollars.)	Frt. cars per \$1,000 Frt. earnings.	
	1910.	1911.	1910.	1911.			1910.	1911.	1910.	1911.		1910.	1911.		1910.	1911.
NEW ENGLAND ROADS:																
Boston & Maine R. R.	2,290	2,290	24,747	25,880	1,133	.....	4.59	10.8	11.3	102.54	191.11	115	.0105	.0109	.0085	.0097
Bangor & Aroostook R. R.	599	622	5,356	5,350	.....	6	0.11	8.9	8.6	118.58	122.79	316	.0280	.0261	.01158	2.43
Central Vermont R. R.	536	536	2,489	2,310	.....	179	7.15	4.6	4.3	79.27	76.12	.086	.077	.0085	.00940	0.82
Maine Central R. R.	932	932	7,030	8,446	1,416	.....	20.14	7.5	9.1	88.90	84.74	.152	.177	.0126	.01034	1.53
New York, New Haven & Hartford R. R.	2,042	2,042	35,716	38,441	2,725	.....	7.63	17.5	18.8	93.44	93.80	.170	.182	.0168	.01390	1.27
Total	6,399	6,422	75,338	80,427	5,089	.....	6.75	11.8	12.5	96.61	95.99	168	.0133	.0121	.01109	1.36
TRUNK LINE ROADS:																
Baltimore & Ohio R. R.	4,434	4,434	83,693	88,342	4,649	.....	5.55	18.9	19.9	191.48	193.29	.105	.110	.0069	.0075	1.31
Buffalo, Roch. & Pittsburgh R. R.	567	573	16,232	15,636	596	.....	3.67	28.5	27.3	154.60	154.70	.205	.190	.0106	.0098	2.02
Central R. R. Co. of New Jersey	631	634	21,958	21,859	99	.....	0.45	34.8	34.5	72.39	71.80	.172	.165	.0103	.0099	1.17
Chesapeake & Ohio R. R.	1,937	2,229	37,453	41,790	4,337	.....	11.58	19.3	18.7	267.00	247.00	.116	.125	.0061	.0069	1.63
Delaware & Hudson Co.	843	878	20,659	20,046	613	.....	2.97	24.5	22.8	129.21	129.35	.141	.127	.0078	.0072	1.13
Delaware, Lack. & Western R. R.	957	985	28,284	28,720	436	.....	1.54	29.5	29.2	170.82	170.82	.111	.108	.0081	.0081	1.08
Eric Railroad	2,227	2,267	48,294	47,239	1,055	.....	2.18	21.7	20.8	163.48	161.67	.112	.101	.0075	.0069	1.18
Lehigh Valley R. R.	1,433	1,430	43,752	43,352	.....	1,960	0.39	30.5	30.5	164.01	160.79	.146	.138	.0089	.0086	1.33
New York Central & Hudson River R. R.	3,785	3,790	71,131	68,167	2,964	.....	4.17	18.3	18.0	192.19	196.00	.089	.080	.0067	.0062	1.11
New York, Ontario & Western Ry.	566	566	6,808	7,267	459	.....	6.73	12.0	12.8	147.76	146.63	.111	.112	.0081	.0075	0.99
Pennsylvania R. R.	4,045	4,085	137,981	139,079	1,098	.....	0.80	34.1	34.0	155.14	155.14	.120	.122	.0064	.0067	1.21
Reading R. R.	998	1,022	40,971	41,912	941	.....	2.30	41.0	41.1	92.93	97.57	.137	.141	.0084	.0085	1.16
Western Maryland R. R.	543	543	6,949	6,780	169	.....	2.43	12.8	12.5	105.66	100.37	.119	.120	.0072	.0071	1.14
Total	22,966	23,436	564,165	570,419	6,254	.....	1.11	24.6	24.3	154.53	154.24	129	.0079	.0078	.00719	1.27
SOUTHERN CLASSIFICATION:																
Atlantic Coast Line Ry.	4,491	4,499	24,322	25,205	883	.....	3.63	5.4	5.6	146.15	151.98	.167	.123	.0148	.0142	1.17
Central of Georgia R. R.	1,916	1,915	10,095	10,084	.....	11	0.11	5.3	5.3	149.69	146.79	.138	.138	.0111	.0107	1.21
Florida East Coast Ry.	583	583	1,150	1,104	.....	46	4.00	2.0	1.9	164.21	153.64	.065	.056	.0121	.0091	0.51
Louisville & Nashville R. R.	4,591	4,621	43,019	44,564	1,545	.....	3.69	9.4	9.6	169.36	172.01	.118	.117	.0086	.0087	1.14
Mobile & Ohio R. R.	1,114	1,114	10,682	10,483	.....	199	1.86	9.6	9.4	219.34	221.05	.095	.095	.0075	.0071	1.28
Nashville, Chat. & St. Louis R. R.	1,230	1,230	9,557	9,950	393	.....	4.11	7.8	8.1	148.00	147.00	.355	.380	.0113	.0116	1.14
Norfolk & Western R. R.	1,937	2,004	38,025	41,157	3,132	.....	8.24	19.6	20.5	264.53	263.18	.103	.063	.0057	.0036	0.80
Norfolk Southern R. R.	602	608	2,859	2,887	.....	272	9.51	4.7	4.3	74.70	77.83	.276	.234	.0258	.0210	1.30
Seaboard Air Line Ry.	2,997	3,037	14,712	14,733	21	.....	0.14	4.9	4.8	150.64	142.02	.118	.109	.0120	.0116	1.00
Southern Railway	7,050	7,042	49,092	50,978	1,886	.....	3.84	7.0	7.2	164.65	156.70	.130	.129	.0099	.00957	1.29
Total	26,511	26,653	203,513	210,845	7,332	.....	3.12	7.7	7.9	164.12	163.21	157	.0128	.0108	.01188	1.08

Note:—Narrow gage cars excluded. Non-revenue cars excluded. Company freight included.

COMPARATIVE SUMMARY OF FREIGHT CARS IN SERVICE ON RAILWAYS OF THE UNITED STATES—(Continued)—1910 AND 1911.

Note:—
Narrow gage cars excluded.
Non-revenue cars excluded.
Company freight included.

CENTRAL CLASSIFICATION:																	
Chicago, Ind. & Louisville R. R.	616	617	5,895	6,003	108	.....	1.83	9.6	9.7	149.00	132.67	163	.0112	.00773	.00836	1.45	1.48
Cincinnati, Hamilton & Dayton Ry.	1,036	1,015	11,881	12,215	334	.....	2.05	11.5	12.0	127.93	127.63	159	.0090	.00529	.00528	1.76	1.77
C. C. & St. L. R. R.	1,982	2,012	24,477	23,870	.....	607	2.48	12.3	11.9	151.80	149.00	.089	.0062	.00546	.00550	1.23	1.20
Grand Rapids & Indiana R. R.	587	586	3,228	3,240	2	.....	0.06	5.5	5.5	105.37	100.10	.082	.0068	.00657	.00689	1.04	1.09
Lake Erie & Western R. R.	886	886	3,922	3,514	.....	408	10.40	4.4	4.0	128.34	127.26	.079	.0056	.00656	.00636	0.90	0.83
Lake Shore & Michigan Southern Ry.	1,663	1,775	50,497	50,281	.....	216	0.43	30.4	28.3	158.30	158.30	.118	.0076	.00523	.00532	1.55	1.61
Michigan Central R. R.	1,803	1,817	24,673	25,202	529	.....	2.14	13.7	13.9	152.00	150.00	.094	.0076	.00629	.00642	1.28	1.29
N. Y., Chicago & St. Louis R. R.	1,523	1,533	13,098	12,950	.....	148	1.13	25.0	24.8	203.00	197.00	.091	.0085	.00571	.00504	1.41	1.41
Pennsylvania Company	1,416	1,416	56,444	56,677	233	.....	0.41	39.8	40.0	80.02	79.25	.132	.054	.0077	.0084	1.35	1.52
P. C. C. & St. L. R. R.	1,468	1,467	24,508	24,508	.....	.....	.....	16.7	16.7	117.93	118.19	.072	.080	.0053	.00614	0.87	0.94
Pere Marquette R. R.	2,328	2,331	18,433	18,241	.....	192	1.04	7.9	7.8	179.03	179.62	.125	.123	.0091	.00591	1.65	1.69
Vandalia R. R.	827	827	8,832	8,835	3	.....	0.03	10.7	10.7	105.86	104.80	.122	.0091	.00611	.00661	1.25	1.38
Total	15,135	15,272	245,888	245,526	.....	362	0.15	14.4	16.1	138.25	135.32	.110	.0076	.00601	.00614	1.31	1.35

WESTERN CLASSIFICATION:

Atchison, Topeka & Santa Fe Ry.	9,961	10,400	54,419	59,763	5,344	.....	9.82	5.5	5.7	360.59	347.45	.079	.0059	.01015	.01028	0.76	0.83
Chicago & Alton R. R.	998	1,025	11,884	11,882	.....	32	0.16	11.2	10.5	150.82	151.42	.117	.0079	.00598	.00606	1.46	1.28
Chicago & Eastern Illinois R. R.	966	966	18,881	18,881	.....	.....	.....	19.5	19.5	153.81	150.02	.177	.0091	.00460	.00480	2.04	2.00
Chicago & North Western R. R.	7,629	7,743	62,685	60,971	.....	1,714	2.73	8.2	7.9	141.40	137.92	.175	.0113	.00890	.00900	1.26	1.24
Chicago, Great & Western Ry.	1,495	1,492	49,881	51,050	1,169	.....	3.10	7.9	7.6	266.80	251.20	.083	.0067	.00733	.00718	0.86	0.87
Chicago, Mil. & Puget Sound Ry.	7,297	7,296	11,772	11,407	.....	365	3.10	7.9	7.6	273.32	258.68	.093	.0070	.00733	.00718	0.86	0.87
Chicago, Rock Is. & Pacific R. R.	1,434	1,434	43,415	42,642	.....	773	1.78	5.9	5.8	259.61	252.12	.141	.0070	.00733	.00718	0.86	0.87
Chicago, St. P. & Omaha R. R.	8,044	8,026	10,895	11,513	618	.....	5.67	6.0	6.0	595.61	532.14	.141	.0070	.00733	.00718	0.86	0.87
Colorado, St. P. & Omaha R. R.	1,739	1,744	40,380	42,437	2,057	.....	5.99	5.0	5.3	209.55	220.92	.095	.0077	.00733	.00718	0.86	0.87
Denver & Rio Grande R. R.	2,062	2,008	11,606	11,901	295	.....	2.34	6.7	6.8	148.10	157.87	.173	.0108	.00908	.00902	1.19	1.13
Duluth, S. S. & Atlantic R. R.	2,541	2,553	14,850	14,996	146	.....	1.03	5.8	5.8	104.51	105.83	.145	.0096	.00933	.00940	0.80	0.85
Great Northern Ry.	606	612	3,056	3,009	.....	47	1.47	5.0	4.9	67.31	66.62	.111	.0076	.00837	.00880	1.43	1.49
Iowa Central R. R.	7,147	7,294	44,283	46,101	1,818	.....	4.11	6.2	6.3	244.31	232.23	.111	.0076	.00837	.00880	1.43	1.49
Kansas City Southern Ry.	558	559	59,330	57,657	.....	1,693	2.85	13.0	12.6	166.67	167.20	.121	.0085	.00588	.00609	1.53	1.46
Minn. & St. Louis R. R.	827	827	6,536	6,536	.....	900	13.77	7.9	6.8	240.01	225.06	.090	.0085	.00588	.00601	1.34	1.25
Minn. St. P. & S. Ste. Marie R. R.	1,027	1,027	4,385	4,224	.....	161	3.67	4.3	4.1	108.95	107.59	.184	.0123	.00725	.00787	0.90	0.77
Missouri Pacific Ry.	3,533	3,770	21,453	14,296	.....	7,157	33.36	6.1	3.7	215.88	213.61	.123	.0119	.00722	.00815	1.23	1.20
Northern Pacific R. R.	6,072	6,072	38,837	38,837	.....	.....	2.32	5.4	5.4	217.90	212.99	.100	.0070	.00688	.00715	0.99	1.03
Northern Pacific R. R.	5,814	6,017	43,100	43,100	2,419	.....	10.75	7.3	7.3	193.05	170.26	.118	.0113	.00703	.00715	1.32	1.37
St. Louis & San Francisco R. R.	5,072	5,188	27,899	29,242	1,343	.....	4.81	5.5	5.6	155.66	151.38	.119	.0082	.00900	.00903	0.88	0.97
St. Louis & Southwestern Ry.	1,473	1,487	9,268	10,934	1,666	.....	17.98	6.3	6.3	260.12	247.92	.092	.0087	.00980	.01080	1.12	1.23
San Antonio & Aransas Pass R. R.	724	724	2,033	1,936	.....	87	4.30	2.8	2.7	155.82	145.92	.087	.0111	.01050	.01080	0.74	0.68
Southern Pacific Co.	10,077	10,202	44,254	47,454	3,200	.....	7.23	4.4	4.7	243.42	231.77	.082	.0097	.01162	.01175	0.57	0.64
Texas & Pacific R. R.	1,885	1,885	10,983	10,957	.....	26	0.24	5.8	5.8	184.00	180.00	.097	.0099	.01010	.01030	0.98	1.00
Union Pacific R. R.	6,296	6,678	25,618	28,377	2,759	.....	10.77	4.1	4.3	345.78	391.96	.060	.0065	.00339	.01024	0.42	0.47
Wabash R. R.	2,515	2,515	21,536	20,587	.....	949	4.40	8.6	8.2	219.56	211.80	.079	.0061	.00385	.00603	1.11	1.02
Total	115,158	118,223	728,801	738,734	9,933	.....	1.36	6.3	6.2	215.49	211.03	.115	.0084	.00887	.00906	1.09	1.09
TOTAL ALL ROADS.....	186,169	190,006	1,817,705	1,845,951	28,246	.....	1.55	9.8	9.7	174.52	171.89	.127	.0092	.00865	.00853	1.20	1.19

COMPARATIVE SUMMARY OF FREIGHT CARS—1900 AND 1911.

NEW ENGLAND ROADS:																			
1900.	1911.	1900.	1911.	1900.	1911.	1900.	1911.	1900.	1911.	1900.	1911.	1900.	1911.	1900.	1911.	1900.	1911.	1900.	1911.
Boston & Maine R. R.	1,787	2,290	12,230	25,880	13,650	.....	111.61	6.8	11.3	66.99	102.54	.126	.119	.0146	.0109	.01440	.01095	1.02	1.00
Bangor & Aroostook R. R.	354	622	3,091	5,350	2,259	.....	73.08	8.7	8.6	89.62	122.79	...	.291	.0539	.0261	.01158	.0261	3.79	2.26
Central Vermont R. R.	513	536	2,006	2,310	304	.....	15.15	3.9	4.3	94.97	76.12	.063	.077	.0079	.0077	.00880	.00940	0.90	0.82
Maine Central R. R.	816	932	8,446	8,460	4,860	.....	135.53	4.4	9.1	81.11	84.74	.163	.177	.0123	.0157	.0130	.01034	1.09	1.53
New York, New Haven & Hartford R. R.	2,008	2,042	13,116	38,441	25,325	.....	193.08	6.5	18.8	85.36	93.80	.076	.182	.0097	.0176	.01451	.01390	0.67	1.27
Total	5,478	6,422	34,029	80,427	46,398	.....	136.35	6.5	12.5	83.61	95.99	.107	.169	.0197	.0121	.01264	.01123	1.49	1.40
TRUNK LINE ROADS:																			
Baltimore & Ohio R. R.	3,179	4,434	61,708	88,342	26,634	.....	43.16	19.3	19.9	194.81	193.29	.128	.110	.0068	.0075	.00412	.00578	1.96	1.31
Buffalo, Roch. & Pittsburgh R. R.	472	573	8,858	15,636	6,778	.....	76.52	18.7	27.3	136.16	154.70	.139	.190	.0097	.0098	.00470	.00487	1.99	2.02
Central R. R. Co. of New Jersey	639	634	15,002	21,859	6,857	.....	45.71	23.4	34.5	77.88	71.80	.153	.165	.0118	.0099	.00871	.00849	1.36	1.17
Chesapeake & Ohio R. R.	1,476	2,229	17,270	41,790	24,520	.....	141.98	21.6	18.7	302.00	247.00	.082	.125	.0058	.0069	.00343	.00640	1.71	1.63
Delaware & Hudson Co.	878	945	20,046	20,046	7,016	.....	53.84	19.6	22.8	94.46	127.35	.147	.127	.0113	.0072	.00789	.00808	1.54	1.13
Delaware, Lack. & Western R. R.	665	985	27,287	20,046	1,433	.....	5.25	28.8	29.2	151.00	170.82	.101	.108	.0144	.0081	.00808	.00752	1.79	1.08
Eric Railroad	2,104	2,267	46,225	47,239	1,014	.....	2.19	21.9	20.8	191.40	181.67	.101	.101	.0089	.0069	.00559	.00585	1.60	1.18
Lehigh Valley R. R.	1,382	1,430	34,954	43,582	8,628	.....	24.68	25.3	30.5	188.08	160.79	.135	.138	.0106	.0086	.00542	.00652	1.97	1.37

COMPARATIVE SUMMARY OF FREIGHT CARS IN SERVICE ON RAILWAYS OF THE UNITED STATES—(Continued)—1900 AND 1911.

COMPARATIVE SUMMARY OF FREIGHT CARS IN SERVICE ON RAILWAYS OF THE UNITED STATES—(Continued)																			
Note:— Narrow gage cars excluded. Non-revenue cars included. Company freight included.	Miles.		Frt. Equipment.		In- crease.	De- crease.	Per cent. change.		Frt. cars per mile of road.		Average length of haul.		Per 1,000 rev. ton miles.		Rate per ton mile. (Dollars.)		Frt. cars per \$1,000 Frt. earnings.		
	1900.	1911.	1900.	1911.			1900.	1911.	1900.	1911.	1900.	1911.	1900.	1911.	1900.	1911.	1900.	1911.	
TRUNK LINE ROADS—(Continued):																			
New York Central & Hudson River R. R.	2,817	3,790	59,180	68,167	8,987	.....	15.19	21.1	18.0	163.00	196.00	.....	0.088	0.062	0.0560	0.0633	1.72	1.11
New York, Ontario & Western Ry.	480	566	5,899	7,267	1,368	.....	23.19	12.3	12.8	142.38	146.63	.....	0.121	0.075	0.0816	0.0754	1.49	0.99
Pennsylvania R. R.	3,716	4,085	80,385	139,079	58,694	.....	73.01	21.6	34.0	109.54	155.14	.....	0.091	0.067	0.0540	0.0587	1.25	1.21
Reading R. R.	1,000	1,022	31,824	41,912	10,088	.....	31.70	41.1	41.1	89.42	97.57	.....	0.114	0.085	0.0831	0.0722	1.53	1.18
Western Maryland R. R.	279	543	6,780	6,780	0	.....	881.18	2.5	12.5	51.02	100.37	.....	0.038	0.071	0.0734	0.0625	0.53	1.14
Total	19,176	23,436	402,313	570,419	168,106	.....	41.78	21.0	24.3	153.16	154.24	.....	0.093	0.078	0.0637	0.0688	1.55	1.27
SOUTHERN CLASSIFICATION:																			
Atlantic Coast Line Ry.	1,759	4,499	5,378	25,205	19,827	.....	368.67	3.6	5.6	121.90	151.98	.....	0.143	0.142	0.1401	0.1215	1.02	1.17
Central of Georgia R. R.	1,196	1,915	5,041	10,084	5,043	.....	100.03	4.2	5.3	148.86	146.79	.....	0.138	0.107	0.1096	0.1096	1.26	1.21
Florida East Coast Ry.	583	583	1,104	1,104	0	.....	.....	.....	.....	153.64	153.64	.....	0.056	0.091	0.0777	0.0777	1.13	0.51
Louisville & Nashville R. R.	3,007	4,621	23,402	44,564	21,162	.....	90.43	7.7	9.6	163.00	172.01	.....	0.090	0.087	0.0758	0.0767	1.13	1.14
Mobile & Ohio R. R.	876	1,114	5,389	10,483	5,094	.....	94.53	6.2	9.4	195.63	221.05	.....	0.095	0.071	0.0590	0.0612	1.33	1.28
Nashville, Chat. & St. Louis R. R.	1,189	1,230	5,328	9,950	4,622	.....	86.75	4.4	8.1	151.00	147.00	.....	0.088	0.116	0.0880	0.1010	1.10	1.14
Norfolk & Western R. R.	1,551	2,004	18,656	41,157	22,501	.....	120.79	2.8	20.5	253.41	263.18	.....	0.063	0.036	0.0430	0.0443	1.58	0.80
Norfolk Southern R. R.	1,147	3,037	4,409	2,587	2,178	.....	532.27	3.2	4.3	37.42	77.83	.....	0.234	0.101	0.1770	0.1620	0.91	1.30
Seaboard Air Line Ry.	2,604	7,042	8,335	14,733	6,398	.....	76.76	4.2	7.2	153.32	142.02	.....	0.109	0.116	0.1180	0.1220	1.14	1.29
Southern Railway	6,306	26,653	98,752	210,845	112,093	.....	90.12	4.2	7.2	168.82	156.70	.....	0.107	0.100	0.0916	0.1066	1.27	1.08
Total	18,635	26,653	98,752	210,845	112,093	.....	113.51	5.3	7.9	157.04	163.21	.....	0.105	0.108	0.1002	0.1066	1.19	1.08
CENTRAL CLASSIFICATION:																			
Chicago, Ind. & Louisville R. R.	546	617	5,440	6,003	563	.....	10.35	9.9	9.7	153.00	132.67	.....	0.155	0.141	0.0757	0.0836	1.86	1.48
Cincinnati, Hamilton & Dayton Ry.	652	1,015	15,494	32,870	17,376	.....	55.84	12.0	12.0	108.96	127.63	.....	0.122	0.091	0.0610	0.0528	2.00	1.77
C. C. & St. L. R. R.	1,891	2,012	3,701	3,820	119	.....	54.16	8.2	11.9	169.30	149.00	.....	0.085	0.062	0.0583	0.0550	1.42	1.20
Grand Rapids & Indiana R. R.	586	586	5,549	5,549	0	.....	7.13	5.2	5.5	90.12	107.10	.....	0.094	0.075	0.0870	0.0689	1.88	1.09
Lake Erie & Western R. R.	725	886	12,938	50,281	37,343	2,035	36.67	7.6	4.0	153.51	158.30	0.070	0.082	0.0614	0.0636	1.89	0.83
Lake Shore & Mich. Southern Ry.	1,411	1,775	19,958	50,281	30,323	.....	77.24	14.1	28.3	178.00	158.30	.....	0.067	0.092	0.0592	0.0642	1.19	1.22
Michigan Central R. R.	1,635	1,817	12,938	50,281	37,343	.....	151.93	14.1	28.3	178.00	158.30	.....	0.067	0.092	0.0592	0.0642	1.19	1.22
N. Y. Chicago & St. Louis R. R.	513	523	4,367	5,677	1,310	.....	92.05	13.1	24.8	297.00	176.25	.....	0.059	0.071	0.0478	0.0515	1.16	1.41
N. Y. Pennsylvania Company	1,396	1,416	43,667	24,508	19,159	.....	90.22	31.5	40.0	77.95	118.14	.....	0.054	0.084	0.0590	0.0585	2.30	1.50
Pennsylvania R. R.	1,407	1,467	12,884	24,508	11,624	.....	28.91	3.1	16.7	111.64	179.62	.....	0.056	0.054	0.0620	0.0614	0.84	0.94
P. C. & St. L. R. R.	1,821	2,331	7,944	18,241	10,297	.....	129.62	4.3	7.8	112.64	179.62	.....	0.123	0.124	0.0902	0.0802	1.55	1.66
Pere Marquette R. R.	727	827	5,922	8,835	2,913	.....	49.19	8.1	10.7	74.46	104.80	.....	0.122	0.119	0.0718	0.0661	1.66	1.33
Vandalia R. R.	13,306	15,272	148,963	245,526	96,563	.....	64.82	11.2	16.1	143.63	135.32	.....	0.112	0.102	0.0645	0.0614	1.57	1.35
Total	13,306	15,272	148,963	245,526	96,563	.....	.....	.....	.....	143.63	135.32	.....	0.112	0.102	0.0645	0.0614	1.57	1.35
WESTERN CLASSIFICATION:																			
Atchison, Topeka & Santa Fe Ry.	7,426	10,400	27,486	59,763	32,277	.....	117.43	3.7	5.7	349.19	347.45	.....	0.073	0.066	0.0976	0.1028	0.81	0.83
Chicago & Alton R. R.	855	1,025	9,386	11,832	2,446	.....	26.06	10.9	11.5	176.16	151.42	.....	0.135	0.104	0.0794	0.0794	1.87	1.28
Chicago & Eastern Illinois R. R.	711	966	8,206	18,861	10,655	.....	129.84	11.5	19.5	144.70	150.03	.....	0.132	0.093	0.0483	0.0483	1.99	2.00
Chicago & Northwestern R. R.	5,219	7,743	40,846	60,971	20,125	.....	49.27	7.8	7.9	151.30	147.92	.....	0.108	0.111	0.0831	0.0900	1.28	1.24
Chicago, Burlington & Quincy R. R.	7,546	9,075	5,782	11,407	5,625	.....	70.72	5.6	7.6	254.87	251.20	.....	0.086	0.081	0.0831	0.0816	1.29	0.87
Chicago, Great Western & N. W. Ry.	930	1,492	5,782	11,407	5,625	.....	97.28	6.2	7.6	301.68	228.62	.....	0.111	0.080	0.0720	0.0718	1.13	1.29
Chicago, Milwaukee & St. Paul Ry.	6,423	7,296	35,740	42,642	6,902	.....	19.31	5.6	5.8	189.07	198.68	.....	0.093	0.069	0.0929	0.0941	1.14	0.95
Chicago, Milwaukee & St. Paul Ry.	1,917	1,917	.....	.....	.....	.....	147.45	4.7	6.3	213.00	220.02	.....	0.094	0.078	0.0990	0.0920	0.98	0.98
Chicago, Milwaukee & Puget Sound Ry.	3,647	8,026	17,150	42,437	25,287	.....	16.07	6.6	6.8	160.55	157.87	.....	0.149	0.102	0.0971	0.0902	1.39	1.13
Chicago, Rock Isl. & Pacific R. R.	1,557	1,744	10,253	11,901	1,648	.....	26.40	3.9	5.4	101.00	105.83	.....	0.118	0.093	0.1242	0.0940	0.93	0.85
Chicago, St. P., Minn. & Omaha R. R.	1,674	2,553	8,359	14,696	6,337	.....	75.81	4.9	5.8	105.83	118.13	.....	0.139	0.093	0.1242	0.0940	1.70	1.49
Colorado & Southern R. R.	1,674	2,553	8,359	14,696	6,337	.....	75.81	4.9	5.8	105.83	118.13	.....	0.139	0.093	0.1242	0.0940	1.70	1.49
Duluth, S. S. & Atlantic R. R.	585	612	2,697	3,009	312	.....	11.57	4.6	4.9	49.07	66.62	.....	0.174	0.085	0.1221	0.0889	0.93	1.06
Great Northern Ry.	5,418	7,294	21,484	46,101	24,617	.....	114.58	3.9	6.3	192.00	232.23	.....	0.104	0.084	0.0851	0.0851	1.45	1.42
Illinois Central R. R.	3,996	4,563	32,439	57,637	25,198	.....	77.68	8.1	12.6	213.83	243.10	.....	0.092	0.084	0.0851	0.0851	1.21	1.25
Iowa Central R. R.	833	559	2,238	3,503	1,265	.....	37.12	4.4	6.8	152.30	167.20	.....	0.118	0.085	0.0851	0.0851	1.49	0.77
Kansas City Southern R. R.	597	1,027	3,066	4,224	1,158	.....	37.77	5.1	41.1	108.79	107.59	.....	0.164	0.119	0.0851	0.0851	1.45	1.20
Minn. & St. Louis R. R.	1,255	3,770	14,296	6,631	7,665	.....	115.59	5.3	3.7	194.65	213.61	.....	0.129	0.109	0.0851	0.0851	1.67	1.64
Missouri Pacific Ry.	4,938	7,335	25,186	38,837	13,651	.....	157.69	5.1	5.4	236.24	212.99	.....	0.102	0.074	0.0851	0.0851	1.15	1.03
Missouri, Kansas & Texas Ry.	2,218	3,395	23,138	29,242	19,962	.....	187.37	4.6	7.1	309.60	278.80	.....	0.103	0.075	0.0851	0.0851	1.04	0.97
Northern Pacific R. R.	5,006	6,017	23,138	43,100	19,962	.....	382.49	3.6	7.3	182.05	245.55	.....	0.123	0.114	0.0851	0.0851	1.17	1.23
St. Louis & San Francisco R. R.	1,659	1,724	5,974	10,934	5,488	.....	103.00	4.3	7.3	196.28	245.55	.....	0.127	0.113	0.0851	0.0851	0.95	0.68
St. Louis Southwestern R. R.	1,258	1,487	5,386	10,934	5,488	.....	10											

General News Section.

The Canadian Pacific is preparing to use the Morkrum rapid printing telegraph between Montreal and Toronto.

The track repairmen on the Grand Trunk Pacific have had their pay advanced to a minimum basis of \$2 a day for laborers and \$79 a month for foremen.

The Minneapolis, St. Paul and Sault Ste. Marie on August 1 began running through passenger trains between Minneapolis and Duluth and Superior.

The House Committee has reported favorably to Congress a bill, introduced by Representative Martin, of Colorado, which prescribes eight hours as the working day for railway telegraphers and switchmen.

The attorney general has laid before the House committee at Washington a bill which would limit the powers of the courts in reviewing decisions of the Interstate Commerce Commission. According to this bill the commission's findings of facts would not be reviewable by the courts.

Near Laketon, Ind., the Erie has bought two farms, embracing 540 acres. The road is building a second track through Wabash and Huntington counties, and property owners were asking such heavy damages that it was found cheaper to buy land needed for earth embankments and dispose of it after the fills are made.

The eastern lines have decided that, beginning Saturday, August 10, they will close all of their freight houses in Chicago on Saturday afternoon during the rest of August. The western lines having already taken similar action, this will mean the closing of all freight houses in Chicago on Saturday afternoon at least during August.

In the superior court at Boston, July 31, six division superintendents of the Boston Elevated Railway were held in \$1,000 bonds each for trial on indictments charging perjury. The charges appear to be based on the fact that in the inquiries which have recently been held concerning the strike of conductors and motormen on that road, the superintendents had sworn that they did not discharge employees for belonging to or joining a union.

The New York, Westchester & Boston Electric railway, which is a New York, New Haven & Hartford subsidiary, on August 3 extended its passenger service from 180th street, New York, south to the Harlem river at 133rd street and Willis avenue. From 180th street south to West Farms Junction, about one mile, the company operates over its own tracks, and from this point uses the New Haven's track to 133rd street and Willis avenue $3\frac{1}{4}$ miles. Train service was also extended, on August 3, in White Plains from the Mamaroneck avenue station north to Westchester avenue, about half a mile. The freight yard in White Plains has been put in service, and the company is now prepared to move freight regularly, using an electric switching locomotive which is suited to road service, although this traffic will be quite light for the present. The line is now in operation throughout its whole length. From Westchester avenue, White Plains, to 133rd street, New York, the distance is about 20 miles. The branch from Columbus avenue, Mount Vernon, to New Rochelle, is about two miles long. All trains connect at the same platform, with those of the Third Avenue Elevated, so that the new road now affords quick and cheap transit to the lower end of Manhattan. The local trains of the Westchester road make stops at the three way-stations on the New Haven track, and the New Haven trains now all pass these stations without stopping. The running time of express trains from the Harlem River station at Willis avenue to the northern terminus at White Plains, 20 miles, is 37 minutes; fare 35 cents. (May 24, p. 1181.)

Fire Precautions on the Boston & Maine.

The Boston & Maine is watching fire dangers very closely. E. A. Ryder, fire claim agent, reports that the claims this

season for damaged forests are \$200,000 less than a year ago. The company has issued rules against making bonfires on the company's property, forbidding the emptying of ashes into wooden receptacles and of smoking where inflammable materials are used. All fires must be promptly reported. Spark arresters with a 3/16-in. mesh have been put on all locomotives and these are inspected each week. Next year the road will petition for a law establishing the doctrine of contributory negligence of individual owners who allow their property to become a menace to that of their neighbors.

Rock Island Organizes Safety Bureau.

The organization of a safety bureau for the Rock Island Lines was announced in a circular issued by President H. U. Mudge to the employees on August 1, as follows:

"The question of 'personal injuries' to employees and others, occurring on the railways of the United States in general and the Rock Island lines in particular, is one which should greatly interest every individual on our pay rolls, as regardless of enormous sums expended annually to promote the safety of our employees and patrons, statistics show that the number of 'personal injuries' is increasing all out of proportion to the number of people involved.

"A careful analysis of the situation as a whole reveals the fact that a very large percentage of these accidents is the direct result of:

- "1. Undue haste.
- "2. Thoughtlessness.
- "3. Carelessness.
- "4. Recklessness.

and therefore easily avoidable; hence it is evident if each employee gives this matter more consideration and proper thought, there will be less suffering and grief and fewer broken homes.

"As a means of producing the desired results, it has been decided to organize a safety bureau, and L. F. Shedd has been appointed general safety supervisor with headquarters in Chicago. He will be assisted by several committees, composed of general, district and division officers, district safety supervisors, and a large number of employees from the rank and file of the various departments, the total membership of such committees approximating six hundred.

"The majority of these committees will meet monthly for the purpose of bringing to the attention of the proper officers, conditions which come under their observation jeopardizing the safety of employees and patrons, and to discuss ways and means of reducing 'personal injuries.' Committeemen are expected to acquire the 'safety first' habit, and communicate it to others.

"Every employee is hereby urged to personally interest himself, family and fellowmen in this work, and to co-operate closely with the safety supervisors and committeemen, that the object sought may soon be attained."

A. C. Ridgway, second vice-president, also issued a circular outlining the organization of the committees. The general safety committee will be composed of the assistant to the second vice-president, as chairman, the general managers of the three districts, the chief engineer, claims attorney, general claim agent, chief surgeon and general safety inspector, who will act as secretary. The district safety committees will be composed of district officers, with the assistant general managers as chairmen, and the division safety committees of division officers and employees with the division superintendents as chairmen. There will also be terminal, division and shop safety committees at the principal terminals and shops. Members of the division and shop committees other than officers will be appointed by the division superintendent and will hold office for six months.

Enthusiastic Support from T. R. for "See America First Movement."

E. L. Bevington, secretary of the Transcontinental Passenger Association and temporary chairman of the "See America First" Association, recently addressed letters to the presidential candi-

dates, enclosing copies of a resolution proposing the organization of the association, and requesting an expression of views in regard to the movement. President Taft replied promising his co-operation in any way possible, and expressing the hope that he would be able to attend the opening of the convention of the association in the fall.

One of the letters was addressed to Colonel Roosevelt at Oyster Bay. In due course of time came a reply under the letterhead of the National Progressive Headquarters in New York, as follows:

"Colonel Roosevelt is at present so overwhelmed with mail that he has requested me to reply to your very kind letter. He feels very much encouraged by your support and wishes to say that he is going to make the hardest kind of a fight that he knows how and hopes that you will continue to back him up. Sincerely yours (Signed) George E. Roosevelt."

The association needs a good press agent, and from this letter it seems to have got the best there is. "There are three great advertisers in this country," said an observing humorist once. "Thomas W. Lawson is one of them, and Roosevelt is the other two."

Interference with Telegraph Wires by Wireless.

A curious phenomenon in connection with wireless telegraphy has been observed in the neighborhood of the Clichy-Levallois railway station, near Paris. In proximity to the railway line some telegraph lines were recently erected on columns fitted with ordinary insulators. The workmen occupied on the section experienced severe shocks when they touched the wires. Experiments were made to discover the cause of this phenomenon and, as a result, it was found that the currents were produced by Hertzian waves originating from the wireless telegraph station at the Eiffel tower.—*Telegraph Age*.

The Stanley Committee's Report on U. S. Steel.

The majority report of the Stanley committee on its investigation of the United States Steel Corporation has been presented to Congress, and Congressman Stanley has asked that a definite time be set for discussion of the report and of the bills presented with the report. The final forms of the three bills which the majority recommend differ in some respects from the first drafts made public, which were printed in the *Railway Age Gazette* of July 26, page 167. The amendment of the Sherman law has been changed in phraseology somewhat, and certain clauses have been inserted making its meaning more clear and definite, which clauses would presumably have been read into the law by the courts in their interpretation of it. In the final draft the amendments to sections 16, 17 and 18 of the Sherman law have been omitted. The amendments in the preliminary draft printed in these columns had to do with the right to intervene.

A Full-Crew Order in Massachusetts.

The Massachusetts railway commission, acting under an order from the legislature, has issued directions requiring all freight trains to be fully manned. All trains running for a distance of five miles or more must have at least two brakemen; all trains propelled by two locomotives, running 10 miles or more, must have three brakemen; all trains while using the opposite main track to allow other trains to pass or to set off and take on cars, where the brakeman is required to protect the opposite track, must have at least three brakemen; and all light engines operated for a distance of ten miles or more must have one brakeman.

These requirements shall not be construed to apply in a case of emergency. The companies are instructed to commence operating under these new rules September 3.

Increase in the Rate for Interchanged Freight Cars.

The increase in the rate per diem for freight cars interchanged between railways from 30 and 35 cents a day to a uni-

form rate of 45 cents throughout the year, which was approved at the spring meeting of the American Railway Association in New York City last May (*Railway Age Gazette*, May 17, page 1098), has been confirmed by letter ballot and, therefore, will go into effect on January 1, next. The vote in favor was 179 members, owning or controlling 1,708,001 cars; negative, 162 members, 638,885 cars; not voting, seven members, 2,703 cars. The numbers necessary to carry the proposition were 175 members, 1,566,393 cars.

The association, by letter ballot, has also confirmed the action taken in May abolishing per diem rule No. 5 on July 1, 1913. This is the rule providing for a reclaim on cars handled by switching roads. The question of suitable arrangements to take the place of the reclaim rule will probably be taken up at once by the committee on relations between railways. The abolition of the reclaim was carried by the following vote: Affirmative, 189 members, 1,580,895 cars; negative, 138 members, 758,260 cars; not voting, 21 members, 10,434 cars.

W. A. Garrett Gives Warning Regarding Car Shortage.

W. A. Garrett, chairman of the Western Association of Railroads, is distributing broadcast this week the following warning and appeal to western shippers and consignees to co-operate with and support the railways in an effort to avert a very severe car shortage this fall, which is feared for reasons stated in Mr. Garrett's circular:

"The time is here for the railways and shippers of the United States to begin active and energetic preparations to prevent a car shortage. The indications are that if they do not begin such preparations at once they will be confronted next October with the worst situation that has existed since October, 1907, just before the panic. No railway man or shipper needs to be told what that situation was. None needs to be told what was the condition in the preceding fall and winter of 1906-1907. Railway facilities were inadequate to move the business; yards and terminals were congested; and heavy loss to the railways, the shippers and the public resulted.

"Why do I think we are likely to be confronted with a similar condition this fall unless all concerned join hands and heartily co-operate to prevent it? The belief is based on the car surplus and shortage figures of the American Railway Association. The latest figures we have show the car situation on July 18, 1912. Let us see what was the situation on practically the same date in each of the last preceding four years, and what followed.

"On July 22, 1908, the car surplus was 308,680 and the shortage 509, a net surplus of 308,071. On October 28, 1908, the surplus had been reduced to 110,912 and the shortage had increased to 10,839, leaving a net surplus of 100,073. This was a decline in available cars since July of 207,998.

"On July 21, 1909, the surplus was 243,334 and the shortage 339, making a net surplus of 243,015 cars. On October 27, 1909, the surplus had been reduced to 30,896 and the shortage had increased to 36,636, leaving a net shortage of 5,740 cars. This was a reduction in the available car supply since July of 248,765.

"On July 20, 1910, the surplus was 134,594 and the shortage 1,293, making a net surplus of 133,301. By October 26 the surplus was down to 13,072 and the shortage up to 21,896, making a net shortage of 8,824 cars. This was a reduction in net available car supply since July of 142,125.

"On July 19, 1911, the surplus was 150,433 and the shortage 1,361, making a net surplus of 149,072. By October 25 the surplus was down to 39,306 and the shortage up to 18,774, leaving a net surplus of 20,532. This was a reduction in the available car supply since July of 128,540 cars.

"In these four years the reduction in the net car supply between the third week in July and the third week in October varied from 128,540 to 248,765 cars. On July 18, 1912, the surplus was 75,389 and the shortage 6,467, making a net surplus of 68,922. Therefore, if the reduction in the available car supply between July and October, 1912, be only equal to the smallest reduction that has taken place in the same period in any of the preceding four years, viz., 128,540 cars, we would be confronted on October 25 with a net shortage of 59,618 cars. If the reduction in the available supply

of cars should be as great as it was in 1909 we would face on October 25 a shortage of 189,147 cars.

"The situation created by even the smaller of these shortages would be appalling and the resulting losses suffered by all commercial, industrial and transportation interests enormous.

"Conditions that are likely to cause a heavy demand for, and a rapid reduction in the supply of, cars exist. The amount of traffic handled varies greatly during different parts of the year. During about eight months there usually are large car surpluses. During about four months, beginning around October 1, there are apt to be shortages. This is owing chiefly to the fact that that is the season of heaviest crop movement. Now, the crop prospects in the west this year are unusually good. That helps to make the prospect of a car shortage unusually bad.

"The railway managements are doing and will do everything that they can to provide for satisfactory handling of the traffic. Their net earnings per mile were less in the fiscal year 1911 than they were in 1910, and they were less in 1912 than they were in 1911. Meantime, in 1912 their taxes were increased over 1911 and in 1911 they increased over 1910. These developments, both of them impairing the managers' ability to maintain and develop the properties, have prevented, and are still preventing, them from buying the equipment and making the other improvements that conditions demand. The situation apparently confronting us is precisely what the managers repeatedly during recent years have predicted would come if the present policy of regulation were not changed. Nevertheless, hampered though they have been, they have made numerous improvements in plants and operating methods. For some years the purchases of equipment were relatively small, but recently they have substantially increased.

"The managers, however, cannot do everything. If the bad situation now threatening is to be averted, they must have the hearty support and co-operation of the shippers and consignees of the country. The shippers and consignees can give such support and co-operation in at least two ways:

"1. By moving all the lumber, coal, cement, and other freight that they can within the next few weeks, instead of delaying and throwing it all on the railways when they are staggering under the crop movement. Mr. Frank T. Bentley, traffic manager of the Illinois Steel Company, and the Indiana Steel Company, anticipating a car shortage, this fall, recently issued an appeal and warning to all patrons of these companies to place their orders for cement and other commodities early. Much might be gained if the traffic managers of all the large industrial concerns of the country would follow Mr. Bentley's example and their patrons would act on the advice given. The commercial organizations of the cities and towns can help greatly by urging their members to move all goods as early as possible.

"2. Shippers and consignees can greatly help themselves, the railways and all other shippers and consignees by loading and unloading all cars delivered to them as expeditiously as practicable. Every time the loading or unloading of a car is needlessly delayed the available supply of cars is needlessly reduced; and no shipper has any right to complain that he is not furnished enough cars if he is by his own acts needlessly and wrongfully reducing the available supply of cars. Commercial organizations cannot render a better service to their members than by urging on them the need for prompt loading and unloading. Cars are furnished for transportation, not for storage; and every one used for storage reduces the number available for transportation.

"3. Shippers can help greatly by loading all cars to as near their capacity as conditions make practicable.

"There has been a great deal of talk in recent years about the need for better co-operation between railways and shippers. Here is a matter regarding which they can heartily and energetically co-operate to the very great gain of both."

"Safety First" on the Union Pacific and the Oregon Short Line.

Among the safety measures which the Union Pacific and the Oregon Short Line have adopted in the last 10 years are auto-

matic block signals, surprise tests, boards of inquiry, including in their membership prominent citizens, to study the causes of accidents and give prompt and full publicity to all the features connected with them, and the equipment of all shop tools with modern safety devices to avoid industrial accidents. The Union Pacific has also improved the methods of instructing employees, by establishing an education bureau among other means.

These safety measures on the Union Pacific, have made a great reduction in the accident record. In the fiscal year 1904 there were 279 train accidents of all kinds; in 1912 there were but 92. The record of the fiscal year 1912 shows 30 per cent. less preventable disasters of all kinds than the fiscal year 1911. As an additional safety measure a "Bureau of Safety" was inaugurated on this road on July 1, last. The bureau comprises a central committee of safety, several division committees of safety, and a district shop committee.

The central committee consists of the four assistant general managers, Charles Ware, Charles E. Fuller, R. L. Huntley and W. D. Lincoln and Dr. A. F. Jonas, chief surgeon; F. E. Lewis, superintendent of dining cars and hotels; J. H. Stafford, general store keeper; and S. J. Peterson, general claim agent. These officers are permanent members of the committee. This committee and the district committees select their chairmen.

Each division committee includes the superintendent, the members of his staff, and ten or more employees, each from a different department. The superintendent is the permanent chairman, and the members of his staff are the permanent members of the committee. The other members serve for three months, when they retire in favor of other employees. The purpose in changing the personnel of the committees is to get the benefit of the suggestions of employees in all departments, and as many of them in each department as is possible to obtain.

The district committee for the Omaha shops consists of one employee from each of the different branches of shop work and one from the general store.

Each committee will meet at least once a month, and special meetings may be called when desired. Minutes are to be kept of the division and district meetings, and reports of any action taken are to be made to the central committee. At the monthly meetings casualties and personal injuries that occur during the preceding month will be reviewed, and suggestions which have been received from the division committees or from other sources will be studied and recommendations as to the prevention of future accidents will be made.

Suggestions for increasing safety or preventing accidents which are brought to the attention of the division committees and do not involve changes in standards, or standard practices will be disposed of by the superintendent. Other matters are to be submitted with recommendations to the central committee, where they may either be disposed of by the committee or submitted to Vice-President and General Manager W. B. Scott, with recommendations. The central committee is empowered to secure expert advice on any subject which may require such action. The central committee is to issue and distribute a monthly bulletin summarizing the suggestions adopted and the action taken. Monthly reports are to be made by the division and district committees as to accidents or personal injuries in such form as will show the accidents to employees in the different branches of the service, accompanied by a statement showing the number injured in each department per one thousand work hours. This will furnish a basis of comparison between the divisions.

Members of the committees are supplied with a small button to be worn on the coat lapel, and they are requested to retain and wear this button after they have served their term on the committee. A suitable award is to be made each year to the division having the best record for safety. All employees are encouraged to make suggestions toward increasing safety to any member of any committee.

On July 1 the Oregon Short Line also inaugurated a safety committee plan. In the bulletin in which it is announced W. H. Bancroft, vice-president and general manager, says, "The idea in this movement is that employees can and should be the controlling factors in preventing injuries in every branch of the service. The keynote of this safety movement is the safety

of the employees in the service, and the slogan is that it is 'better to cause a delay than to cause an accident,' and that it actually takes less time to avoid an accident than it does to make out accident reports and explanations about how it occurred and how it could have been prevented. The foremost endeavor of this movement is to apply the remedy before the accident occurs, and not to wait until afterwards, and its constant aim will be to secure greater safety through more rigid inspections and stricter adherence to the rules of the company."

To the employees he says: "Letting well enough alone is letting everything alone; and doing nothing is doing the wrong thing. Be careful yourselves, insist upon your fellow workers being careful, call attention to all dangerous conditions and report all those not exercising care or heeding warnings, and accidents will not happen so frequently." Here also there is a central safety committee and a division committee for each division. The personnel of the central committee, which is permanent, is as follows: W. H. Bancroft, vice-president and general manager (chairman); E. C. Manson, assistant general manager; J. F. Dunn, assistant general manager; Carl Stradley, assistant general manager; P. L. Williams, general attorney; F. H. Knickerbocker, assistant general manager; E. M. Bagley, claims attorney; George H. Smith, assistant attorney, and Dr. S. H. Pinkerton, chief surgeon.

The methods of making reports and co-operating with the employees and the heads of departments is practically the same on this road as on the Union Pacific. The division committees are empowered to appoint sub-committees to make special reports, as the occasion may demand, and the unit of comparison of division accident records for train and yard employees will be based on accidents per million locomotive miles, and for maintenance of way and shop employees on the man hour basis.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

- AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass. Convention, May, 1913, St. Louis, Mo.
- AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Boston, Mass.
- AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—W. C. Hope, New York; next convention, September 12, Seattle, Wash.
- AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, East St. Louis, Ill.
- AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—W. C. Cooder, Carew building, Cincinnati, Ohio; 3d Friday of March and September.
- AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York. Convention, October 7-11, Chicago.
- AMERICAN ELECTRICAL RAILWAY MANUFACTURERS' ASSOC.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.
- AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York; annual, November 20, 1912, Chicago.
- AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.
- AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, 1011 S. Michigan Ave., Chicago. Convention, March 18-20, 1913, Chicago.
- AMERICAN RAILWAY MASTER MECHANICS' ASSOC.—J. W. Taylor, Old Colony building, Chicago.
- AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—M. H. Bray, N. Y. N. H. & H., New Haven, Conn.
- AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.; annual, June, 1913.
- AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.
- AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.
- AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.
- AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Baltimore, Md. Convention, 3d week in January, 1913, Chicago.
- ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago.
- ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago.
- ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago; annual, October 21-25, Chicago.
- ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 112 West Adams St., Chicago; annual, May 20, 1913, St. Louis, Mo.
- ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York. Meeting Dec. 10-11, 1912, New Orleans, La.
- CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.
- CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.
- CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.
- CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.
- CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.
- ENGINEERS' SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.
- ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.
- FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va.
- GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.
- INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, 11, rue de Louvain, Brussels, Belgium. Convention, 1915, Berlin.
- INTERNATIONAL RAILWAY FUEL ASSOCIATION.—C. G. Hall, 922 McCormick building, Chicago.
- INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—L. H. Bryan, Brown Marx building, Birmingham, Ala.
- INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio. Convention, August 20, Chicago.
- MAINTENANCE OF WAY MASTER PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—W. G. Wilson, Lehigh Valley, Easton, Pa. Convention, November 19-21, Chicago.
- MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York. Convention, May, 1913, Chicago.
- MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago.
- MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOC. OF U. S. AND CANADA.—A. P. Dane, B. & M., Reading, Mass. Convention, September, 10-13, Denver, Col.
- NATIONAL RAILWAY APPLIANCES ASSOC.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.
- NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.
- NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.
- NORTHERN RAILROAD CLUB.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.
- PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, Union Station, Peoria, Ill.; 2d Tuesday.
- RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.
- RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 2 Rector St., New York; annual, November 20, 1912, New York.
- RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.
- RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOC.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.
- RAILWAY GARDENING ASSOCIATION.—J. S. Butterfield, Lee's Summit, Mo.; next meeting, August 13-16, Roanoke, Va.
- RAILWAY DEVELOPMENT ASSOCIATION.—W. Nicholson, Kansas City Southern, Kansas City, Mo. Next meeting, Nov. 17, 1912, Cincinnati, Ohio.
- RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa. Convention, Oct. 8-11, Quebec.
- RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio.
- RAILWAY SUPPLY MANUFACTURERS' ASSOC.—J. D. Conway, 2135 Oliver bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.
- RAILWAY TEL. AND TEL. APPLIANCE ASSOC.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.
- RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.
- ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling, Ill. September 10-13, Buffalo, N. Y.
- ST. LOUIS RAILWAY CLUB.—B. W. Fraumenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.
- SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.
- SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Niquist, La Salle St. Station, Chicago.
- SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.; annual, Oct. 17, Atlanta, Ga.
- SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.
- TOLEDO TRANSPORTATION CLUB.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.
- TRAFFIC CLUB OF CHICAGO.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.
- TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.
- TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.
- TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7042 Stewart Ave., Chicago.
- TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; first Saturday after first Wednesday.
- TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.
- TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; annual, Aug. 27-30, Chicago.
- WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.
- WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.
- WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News.

The Canadian railway commission has completed its series of hearings concerning freight rates in western Canada, having, during the past month, held sittings in eight of the leading cities and listened to 95 complaints. The railways will be called upon to make reply at Ottawa in October.

Albert Snyder has been appointed manager of the Western Massachusetts Traffic Bureau, Springfield, Mass., which is connected with the Springfield board of trade. Mr. Snyder was formerly and for many years in the freight department of the New York, New Haven & Hartford and other railways.

The Georgia Southern & Florida is this week running an agricultural instruction train, covering the same territory that was traversed by the similar train two months ago. An effort will be made to promote the organization of a truck-growers' association and to show the advantage of shipping fruit and vegetables in carloads.

The Western Maryland is now running freight trains over its new extension to Connellsville, Pa. This connection establishes a new through line from Chicago to tidewater via the Lake Shore & Michigan Southern, the Pittsburgh & Lake Erie and the Western Maryland. The traffic possibilities of this line were discussed in the *Railway Age Gazette* of February 3, 1911, p. 195, and January 28, 1910, p. 173.

The Senate on Wednesday agreed with the House in that clause of the legislative, executive and judicial appropriation bill which abolishes the Commerce Court; so the bill will undoubtedly go to the President in this shape. As this section of the bill now stands, the court will be abolished and the judges will become judges of the Circuit Courts. The vote in the Senate was 30 to 19.

The Pennsylvania and other companies operating in the central states have abandoned their decision not to run low rate one-day excursions, and announcements of special rates have been made by several roads. The attorney general of Ohio last week announced that he was going to bring suit against the southwest system of the Pennsylvania—the Pittsburgh, Cincinnati, Chicago & St. Louis—on the charge that, in agreeing with other roads not to run low priced excursions, the P. C. C. & St. L. had violated the law of Ohio.

One of the changes which are now being discussed before the Trunk Line Committee at New York is the changing of l. c. l. shipments of eggs from second-class to first-class. The same change is also proposed for butter and live poultry. It is claimed by some of the traffic men of the railways that if it were possible they would like to refuse to carry eggs in l. c. l. lots entirely. They say that consignees refuse to receive shipments on the slightest pretext and the railway has no course left open but to sell the eggs at the best price it can get and pay the claims. The hearings on the changes in classification will last, it is expected, for several weeks.

The Chicago Great Western on August 4, adopted a new timetable which practically restores the passenger service in effect during the summer of 1911. Train No. 3 will leave Chicago at 8:45 a. m., arriving at Minneapolis at 10:45 p. m., and the southbound train, No. 4, leaves Minneapolis at 8 a. m., arriving in Chicago at 9:55 p. m. Between Kansas City and St. Paul and Minneapolis a reduction of one hour and twenty minutes will be made northbound, the train leaving Kansas City at 11:30 p. m., and arriving at Minneapolis at 8:10 p. m., instead of 9:30, while southbound a reduction of one hour and fifty minutes will be made, the train leaving Minneapolis at 10:20 a. m. instead of 8:30, and arriving at Kansas City at 7:10 a. m.

The Pennsylvania has not given its industrial department much advertising, but the work has been done, all the same. The thirteen division freight agents have for years given careful attention to industrial development. Now the company announces that a department head has been appointed, in the person of John H. Whittaker, special agent. His office is at the general freight department, Broad street station, Philadelphia, and he acts under the direction of the general freight agent. He keeps an active list of available buildings and sites and is prepared to furnish full information regarding them. The com-

pany has just issued an industrial directory containing a classified list of commodities, names of shippers and receivers at all towns on the road; also directories of wholesale fruit and vegetable dealers, of fruit, vegetable and produce growers and shippers, and one of grain and flour dealers, flour and feed mills, elevators and warehouses, and hay and straw shippers.

INTERSTATE COMMERCE COMMISSION.

The commission has further suspended, from August 12 until February 12, supplement 2 to Atchison, Topeka & Santa Fe tariff advancing coal rates from points in Colorado to stations in Kansas, Oklahoma and Texas.

The commission has further suspended, from August 10 until February 10, supplement No. 2 to the Chicago, Milwaukee & St. Paul tariff, which advances charges for switching ice, in carloads, at Chicago, and in that vicinity.

The commission has suspended until November 30 tariffs filed by railways in Arkansas, Oklahoma and other western states advancing the prices for transportation of corn in the ear. It appears that the advance consisted in changes in the minimum weight to be allowed for a carload.

The commission has changed from September 1 to November 1 the date on which oil pipe line companies must comply with its order requiring them to file tariffs. Some of the companies have begun proceedings before the Commerce Court to restrain the enforcement of the commission's order.

The commission has suspended, from August 18 until February 18, certain schedules contained in the Buffalo, Rochester & Pittsburgh tariff, advancing rates for the transportation of building brick and other articles, in carloads, from Orchard Park, N. Y., and Jewettville, to Canadian points.

The commission has vacated its order suspending the advances in the trans-continental rate on mixed carloads of stoves containing cast iron or steel ranges with gas stove attachments. These advances were cancelled by the carriers, effective July 22, 1912, and the commission has, therefore, vacated its orders of suspension.

Complaint Dismissed.

H. Lesinsky Co. v. Atchison, Topeka & Santa Fe et al. Opinion by the commission:

The commission found that the rate of \$1.46 per 100 lbs. on cheese in carloads from Plymouth, Wis., to El Paso, Tex., was not unreasonable. (24 I. C. C., 620.)

Asbury Smith Logsdon v. Illinois Central et al. Opinion by the commission:

The complainant contended that the rate of \$4.85 per ton on shipments of coal from Marissa, Ill., to Fort Worth, Tex., when loaded in open cars, was unreasonable to the extent that it exceeds \$3.15 per ton. The commission found that the present rate was not shown to be unreasonable. (24 I. C. C., 624.)

Joint Tariffs Restored.

Laona & Northern v. Minneapolis, St. Paul & Sault Ste. Marie. Opinion by Chairman Prouty:

Defendant should reinstate the joint tariffs which existed with complainant carrier prior to May 1, 1910, but under the circumstances of this case the complainant's divisions ought not to exceed 1½ cents per 100 lbs. on lumber and mill products. (24 I. C. C., 639.)

Free Delivery in Washington, D. C.

Caesar E. Casassa v. Pennsylvania Railroad et al. Opinion by the commission:

Complainant alleges that it and other manufacturers located on Fourteenth street, northwest, between Florida avenue and Park road in Washington are discriminated against in favor of the merchants located in that part of the city known as Georgetown, because the defendants deliver free of charge certain classes of freight in less than carload lots to merchants located in the latter section, but refuse to grant like free delivery to merchants located in the former section. The commission found that this practice resulted in discrimination against the mer-

chants on Fourteenth street and ordered that in future the merchants in these two localities should be placed on an equal basis. (24 I. C. C., 629.)

Joint Through Arrangements Restored.

Chippewa Valley & Northern v. Minneapolis, St. Paul & Sault Ste. Marie. Opinion by Chairman Prouty:

Defendant should resume the joint through arrangements which existed with complainant carrier prior to May 1, 1910, and restore the tariffs which were canceled; but divisions allowed complainant should not exceed 1½ cents per 100 lbs. (24 I. C. C., 634.)

Misrouting Caused No Damage.

Lathrop, Shea, Henwood Company v. Lehigh Valley et al. Opinion by the commission:

The complainant contended that its shipments from Egypt, Pa., to Campbell Hall, N. Y., were misrouted by the defendant, and that the rate of \$1.75 per ton charged it was unreasonable to the extent that it exceeds 99 cents per ton, which would have been charged had the routing instructions been followed. The complainant had a contract with the Erie & Jersey Railroad to do some construction work at Campbell Hall, and in the contract the railway agreed to assume all freight charges paid by the complainant in excess of 3 mills per ton per mile for the transportation over the Erie, provided that the shipments to Campbell Hall were prepaid. The commission could not find who was responsible for the failure to carry out the routing instructions, but found that the shipments were not prepaid, and that, therefore, the complainant would have had to assume the total transportation charges, which would have amounted to \$2.05 per ton. As the complainant was not damaged by the misrouting of the shipments, reparation was not awarded. (24 I. C. C., 622.)

Shipment Not Misquoted.

Paine Lumber Company v. Cleveland, Cincinnati, Chicago & St. Louis et al. Opinion by the commission:

The complainant contended that an unreasonable rate was charged it on a shipment of doors from Cleveland, Ohio, to Oshkosh, Wis. Reparation was asked. The complainant had directed that the shipment should go over two specific lines. Two routes were available over these. The joint through rate over both routes was 30½ cents per 100 lbs. The combination of intermediate rates over one of the routes was 33½ cents per 100 lbs., and over the other route, 24½ cents per 100 lbs. The joint through rate over this latter route has subsequently been reduced to 24½ cents per 100 lbs. The shipment moved at the joint through rate over the route on which the sum of the intermediate rates was 33½ cents per 100 lbs. The complainant contended that the shipment was misrouted on the ground that had it moved over the other route a basis for reparation would have existed. The commission found that as the shipment was forwarded in accordance with the routing instructions and as the rate at the time of movement was the same over both routes, the initial carrier did not misroute the shipment. No evidence was offered tending to prove that the 30½ cent rate charged was an unreasonable one when applied to the route over which the sum of the local rates exceeded the joint through rate, and the circumstance that via the other route a combination rate lower than 30½ cents was in effect is not sufficient to establish the unreasonableness of the 30½ cent rate. The complaint was dismissed. (23 I. C. C., 626.)

Articles Lost by Carriers.

Larkin Company v. Erie & Western Transportation Company et al. Opinion by the commission:

Defendants failed to deliver at destination a pedestal weighing 26 lbs., which formed part of a shipment weighing 215 lbs. Complainant shipped a pedestal to replace that lost by defendants and was charged therefor the first-class rate of 56 cents per 100 lbs. Defendants refused to refund the freight charges on the second shipment, but offered a pro rata share of the charges on the first shipment. The commission found that the rules, regulations, and practices of the principal defendant, which exacted of complainant 40 cents for no fault of its own, simply because of the application of the rules and practices themselves, were unreasonable, unjust, discriminatory, and un-

lawful. In so far as a bill of lading establishes a rule, regulation, or practice of transportation, which to every intent is obligatory upon the shipper, the commission has jurisdiction over its provisions. Reparation was awarded. (24 I. C. C., 645.)

Sale of Round-Trip Tickets on Trains.

Charles A. Ford et al. v. Washington-Virginia. Opinion by the commission:

A rule of the defendant which prohibits the sale on its trains of round-trip tickets to interstate passengers from its station in Washington, D. C., where such tickets are kept on sale, not found to be unreasonable or unduly discriminatory. Defendant required to accord to passengers boarding the cars at Bureau of Engraving and Printing, in the city of Washington, the same privileges as at other non-agency stations. (24 I. C. C., 632.)

STATE COMMISSIONS.

The railway commission of Canada has decided to require all railway employees engaged in engine or train service to submit to tests of eyesight and hearing.

The Louisiana railway commission has issued an order requiring that station agents be furnished with prompt and accurate information as to the causes of delays of trains and the amount of delay, and that such information shall be posted in a conspicuous place on the bulletin boards, or otherwise furnished to the public.

The New York Public Service Commission, first district, has ordered a hearing to determine whether the process of laying bricks in the waterproofing work on the subways is real bricklaying. A complaint was made by the bricklayers' union that the process is bricklaying and that the work should be done by bricklayers at union wages, instead of by other laborers, as is now the case.

The New York Public Service Commission, Second district, has been notified by the National Express Company and the Adams Express Company of reductions of from 15 to 44 per cent. in merchandise rates from Cooperstown to various points. These reductions followed a complaint made by the International Milk Products Company of Cooperstown, against the rates on ice cream to various points on the Delaware & Hudson, Ulster & Delaware and other roads.

The Louisiana railway commission has issued an order providing that no through freight rates to or from stations in Louisiana shall exceed the lowest combination of mileage rates by less than 10 per cent., provided that when specific class or commodity rates applying to or from junction points result in making a lower through rate without a deduction of 10 per cent., such combination will apply. The commission has also issued an order providing that carload shipments moving over two or more track scales shall be weighed by the carrier at the first track scales passed over and the weight thus found shall be the weight upon which freight charges shall be assessed. In case of a dispute as to the correctness of the weight carriers shall reweigh the car on track scales at the point of destination, on demand of the consignee, and the freight bill shall be corrected to conform to the last weight. Where the second weighing shows a variation of over 1 per cent. from the first weight no charge shall be made by the carrier for the reweighing. When the second weighing does not show a variation of 1 per cent. the carrier shall charge \$2.50 for each car reweighed. If an additional day is required for the reweighing the consignee is to be allowed one day additional free time.

COURT NEWS.

In the state court at Breckenridge, Colorado, July 31, Judge Rizer handed down a decision sustaining the order of the state railway commission which requires the Colorado & Southern to run a passenger train between Leadville and Denver daily, except Sunday, and a freight train three times a week. The railway company abandoned the operation of its line over Boreas Pass because, on account of the construction of other lines, the operation of that one had become unprofitable; but both the commission and the court hold that the company cannot abandon a part of its road and continue operation of another part.

RÉVÉNUES AND EXPENSES OF RAILWAYS.

MONTH OF JUNE, 1912.

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses			Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating (or loss).	Increase (or decrease) income comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Maintenance of equipment.	Traffic.	Transportation.				
Alabama & Vicksburg.....	143	\$77,959	\$34,601	\$112,560	\$16,256	\$18,787	\$3,873	\$44,407	\$33,339	\$7,112	\$27,061	\$14,691
Atchison, Topeka & Santa Fe.....	8,201	4,685,127	2,098,876	6,784,003	1,079,958	988,028	179,838	2,142,521	2,881,361	250,016	\$231,345	\$263,456
Atlantic Coast Line.....	4,560 ²	1,640,706	615,061	2,255,767	257,820	513,335	59,006	1,021,110	575,237	168,395	406,888	75,691
Baltimore & Ohio—System.....	4,455 ²	6,465,997	1,344,004	7,810,001	1,357,834	1,389,545	178,799	2,751,080	2,474,516	267,538	2,151,982	127,113
Baltimore & Ohio Chicago Terminal.....	77	2,170	31,940	34,110	16,250	16,228	8,535	215,975	50,255	20,925	30,100	30,878
Bessemer & Lake Erie.....	204	1,007,091	37,940	1,045,031	76,283	134,799	8,738	215,975	604,212	9,000	595,212	204,837
Buffalo, Rochester & Pittsburgh.....	570 ⁴	752,564	91,819	844,383	120,313	123,345	10,730	267,332	365,549	12,000	348,663	196,737
Butte, Anaconda & Pacific.....	46	84,129	10,195	94,324	18,809	18,809	7,884	43,714	36,518	2,000	34,518	24,670
Canadian Pacific Lines in Maine.....	233	41,287	19,387	60,674	50,655	10,541	6,677	64,378	—7,147	22,301	—9,143	30,904
Charleston & Western Carolina.....	341	83,639	28,596	112,235	24,041	30,150	3,791	52,688	2,818	10,916	—8,098	—56,180
Chicago & Alton.....	1,025	691,239	357,985	1,049,224	172,611	181,491	39,966	397,887	320,338	37,356	281,691	—54,457
Chicago & Eastern Illinois.....	1,275	864,362	232,796	1,097,158	57,362	64,406	35,113	467,568	444,077	28,500	415,734	148,589
Chicago & North Western.....	7,960 ⁵	4,145,672	1,723,351	5,869,023	1,074,282	648,795	99,536	2,408,995	2,190,367	307,838	1,885,749	48,183
Chicago, Indiana & Southern.....	359 ⁶	281,033	24,458	305,491	315,190	85,467	7,430	107,969	60,139	13,000	47,723	24,455
Chicago, Indianapolis & Louisville.....	617	345,422	140,687	486,109	76,194	73,291	17,532	234,920	116,107	22,881	93,226	46,130
Chicago, Milwaukee & St. Paul.....	2,059 ⁷	1,157,989	272,558	1,430,547	131,849	122,152	37,077	471,470	700,184	75,787	624,385	81,513
Chicago, Milwaukee & St. Paul—Sound.....	7,511	3,434,472	1,338,309	4,772,781	949,346	743,688	98,926	1,983,466	1,479,925	21,674	1,268,951	—44,974
Chicago, Rock Island & Gulf.....	477 ⁸	1,48,649	50,540	204,189	12,757	20,274	11,428	92,774	69,430	8,122	61,003	49,970
Chicago, Rock Island & Pacific.....	7,566 ⁹	3,214,725	1,590,814	4,805,539	508,602	553,835	142,974	1,788,794	2,742,912	14,833	2,503,044	426,039
Chicago, St. Paul, Minneapolis & Omaha.....	1,748 ¹⁰	729,399	402,062	1,131,461	163,706	117,221	26,711	451,285	446,902	66,879	376,089	179,296
Chicago, Terre Haute & Southeastern.....	351	108,514	16,158	124,672	33,023	15,734	3,267	44,488	23,377	8,700	14,375	—22,844
Cincinnati Northern.....	245 ¹¹	76,662	17,825	94,487	22,033	24,528	2,657	40,488	7,365	3,500	2,065	—2,103
Cleveland, Cincinnati, Chic. & St. Louis.....	2,012 ¹²	1,599,286	705,633	2,304,919	359,350	498,819	74,317	959,379	582,102	95,000	485,359	—7,528
Colorado Midland.....	338	94,493	28,415	122,908	27,282	18,241	8,666	64,303	8,940	5,600	2,405	—8,740
Cumberland Valley.....	162	214,421	56,017	270,438	28,314	33,207	4,266	117,829	102,485	5,612	97,294	26,788
Delaware & Hudson Co.—R. R. Dept.....	854 ¹³	1,967,273	249,456	2,216,729	166,537	243,906	31,116	639,302	1,131,801	48,724	1,130,698	476,195
Denver & Rio Grande.....	2,556 ¹⁴	1,417,847	424,221	1,842,068	288,501	351,643	53,474	587,214	592,345	65,500	527,735	—51,714
Denver, Northwestern & Pacific.....	215	73,388	26,978	100,366	20,248	14,101	2,866	32,605	26,882	4,720	22,162	—831
Detroit & Mackinac.....	358 ¹⁵	71,416	26,051	97,467	14,376	18,741	2,757	34,257	31,567	8,250	20,332	10,052
Detroit, Toledo & Ironton.....	441	115,002	12,878	127,880	138,475	23,705	2,404	60,492	27,350	3,361	23,978	77,070
Duluth & Iron Range.....	271 ¹⁶	925,931	19,765	945,696	135,345	135,345	2,730	169,493	573,334	38,338	537,044	—86,780
Duluth, Missabe & Northern.....	351 ¹⁷	1,100,863	44,309	1,145,172	154,365	107,481	2,187	159,745	778,321	53,773	725,594	33,033
Duluth, South Shore & Atlantic.....	623 ¹⁸	196,948	85,162	282,110	89,661	31,290	14,234	105,202	50,133	21,522	29,522	—32,281
El Paso & Southwestern Co.....	902	539,024	87,157	626,181	53,767	84,656	14,241	187,666	291,154	22,432	266,925	75,564
Elgin, Joliet & Eastern.....	841 ¹⁹	1,045,635	15,577	1,061,212	126,279	199,059	4,760	270,878	574,937	24,117	550,820	261,560
Florida East Coast.....	630 ²⁰	203,894	105,421	309,315	352,783	59,619	1,555	136,104	280,288	16,061	53,880	1,236
Grand Rapids & Indiana.....	586 ²¹	239,473	145,929	385,402	62,818	78,076	11,023	178,317	73,695	22,685	48,316	—11,108
Indiana Harbor Belt.....	105 ²²	260,711	30,118	290,829	33,489	30,661	6,156	166,069	46,538	5,400	44,006	—8,258
Kanawha & Michigan.....	177 ²³	260,711	30,118	290,829	33,489	30,661	6,156	166,069	46,538	5,400	44,006	—8,258
Kansas City Southern.....	827	545,522	140,074	685,596	48,465	54,005	2,359	80,608	104,384	7,858	96,446	11,475
Lake Erie & Western.....	886	351,392	70,647	422,039	69,281	89,614	12,281	165,918	96,389	19,868	76,521	—62,579
Lake Shore & Michigan Southern.....	1,775 ²⁴	2,851,864	1,068,517	3,920,381	619,811	820,899	87,511	1,358,737	1,426,690	140,000	1,339,743	331,951
Lehigh & Hudson River.....	97	133,990	3,504	137,494	26,376	19,718	1,248	44,299	42,341	2,730	39,611	—3,502
Long Island.....	399 ²⁵	280,493	782,607	1,063,100	125,887	116,014	14,018	419,256	393,306	56,450	425,158	20,483
Louisiana & Arkansas.....	255	106,621	20,968	127,589	131,894	21,981	2,372	35,329	52,545	4,138	48,407	25,362
Louisiana Western.....	207	97,249	41,119	138,368	19,090	26,323	8,160	53,490	33,526	6,828	22,620	38,213
Maine Central.....	1,204 ²⁶	519,548	329,489	849,037	176,124	125,149	8,605	299,501	280,788	59,055	215,498	—23,952
Michigan Central.....	1,817 ²⁷	1,508,234	803,506	2,311,740	270,254	385,212	63,988	1,073,672	776,864	116,455	662,699	—37,014
Midland Valley.....	37 ²⁸	55,219	37,062	92,281	33,111	19,562	2,106	37,482	2,050	3,875	—1,782	—4,502
Monongahela.....	65	123,000	2,135	125,135	29,021	6,272	271	24,308	64,771	2,000	62,771	26,590
Morgan's La. & Tex. R. R. & S. Co.....	404	184,139	70,358	254,497	137,251	56,493	13,753	178,225	95,330	18,370	115,673	—145,040
New Orleans & North Eastern.....	196	213,114	48,782	261,896	29,471	50,433	11,195	129,712	63,333	12,264	51,152	901
New York Central & Hudson River.....	3,597 ²⁹	4,982,242	3,042,835	8,025,077	1,294,796	1,598,999	174,975	2,984,539	2,682,149	457,675	2,234,872	206,141
New York, Philadelphia & Norfolk.....	112	286,196	39,425	325,621	358,110	51,390	4,263	149,299	115,553	8,781	106,772	45,087
Norfolk & Western.....	2,018 ³⁰	2,958,234	386,581	3,344,815	505,963	650,593	58,168	991,658	1,174,703	1,352	1,056,055	285,468
Norfolk Southern.....	608	196,630	78,859	275,489	39,884	37,803	6,862	92,206	109,439	7,534	98,889	11,563
Norfolk Central.....	473 ³¹	793,325	213,339	1,006,664	141,186	210,075	17,303	488,797	187,478	36,175	151,983	32,815
Pecos & Northern Texas.....	479 ³²	113,370	38,700	152,070	29,974	35,504	2,980	72,237	15,164	2,694	12,470	—41,305
Pennsylvania Co.....	1,760 ³³	4,520,991	886,679	5,407,670	774,972	898,369	88,607	1,842,781	2,206,988	219,260	1,991,415	589,574
Pennsylvania Railroad.....	4,021 ³⁴	10,121,742	3,066,400	13,188,142	1,645,468	2,700,715	211,779	4,857,660	3,480,050	563,083	3,711,247	784,001
Peoria & Eastern.....	352	190,795	56,601	247,396	38,379	43,883	4,712	98,465	73,231	9,800	63,431	39,292
Philadelphia, Baltimore & Washington.....	713	870,768	695,051	1,565,819	264,201	302,015	30,210	705,402	401,758	49,268	352,490	—24,620
Pittsburgh & Lake Erie.....	215	1,406,726	128,532	1,535,258	159,371	171,191	13,636	318,663	872,904	31,000	840,498	205,839
Pittsburgh, Cincinnati, Chic. & St. Louis.....	1,467 ³⁵	2,476,960	721,628	3,198,588	456,041	649,914	70,561	1,219,432	1,092,552	128,552	962,564	125,784
Rutland.....	468	167,178	94,621	261,799	36,808	54,443	8,120	111,991	86,741	11,528	75,213	—9,303
St. Louis Merchants' Bridge Terminal.....	9	.....	314	314	24,893	5,306	467	76,219	35,789	5,600	30,189	17,878

Operating at end of previous period. ¹ 1,755; ² 4,498; ³ 4,434; ⁴ 573; ⁵ 7,743; ⁶ 341; ⁷ 2,051; ⁸ 471; ⁹ 7,551; ¹⁰ 1,744; ¹¹ 246; ¹² 1,979; ¹³ 819; ¹⁴ 2,567; ¹⁵ 360; ¹⁶ 263; ¹⁷ 317; ¹⁸ 612; ¹⁹ 832; ²⁰ 583; ²¹ 587; ²² 109; ²³ 176; ²⁴ 1,663; ²⁵ 395; ²⁶ 1,180; ²⁷ 1,805; ²⁸ 324; ²⁹ 3,591; ³⁰ 2,004; ³¹ 469; ³² 3,977; ³³ 1,468. — Indicates Deficits, Losses and Decreases.

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF JUNE, 1912—(CONTINUED).

Name of road.	Mileage operated at end of period.	Operating revenues			Way and maintenance of structures, equipment.		Operating expenses			Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total.	inc. misc.	Total.	Traffic.	Trans- portation.	General.						Total.
San Antonio & Aransas Pass.....	727	\$252,207	\$107,512	\$378,944	\$90,847	\$77,258	\$5,972	\$159,962	\$16,379	\$350,418	.....	\$28,526	\$11,994	—\$54,332
Southern Kansas & Texas.....	7,090 ³⁸	3,018,144	1,424,672	4,888,598	686,492	725,636	167,476	1,729,571	180,445	3,529,620	.....	1,358,978	1,446,125	1,078
Southern Kansas & New York.....	125	78,411	20,411	103,192	5,507	6,631	1,765	34,618	4,031	68,239	.....	34,953	32,544	1,439
Syracuse, Binghamton & New York.....	81	61,217	33,684	107,215	15,279	13,683	3,593	41,511	2,248	76,314	.....	39,901	24,081	—11,571
Texas & Pacific.....	1,885	709,067	303,119	1,097,906	261,912	251,349	35,652	604,124	44,498	1,197,535	.....	69,629	52,375	—224,497
Toledo & Ohio Central.....	441 ³⁷	414,614	53,326	503,556	75,940	79,200	5,616	149,999	8,028	318,783	.....	184,773	164,424	82,087
Toledo, Peoria & Western.....	248	62,037	36,036	107,055	17,892	18,682	2,680	39,760	3,340	82,532	.....	24,701	20,088	—3,631
Union R. R. of Baltimore.....	9	106,687	131,996	238,683	7,288	.....	681	5,237	2,933	16,139	.....	115,857	110,442	10,914
Union R. R. of Pennsylvania.....	31	.....	.....	502,246	29,936	99,931	100	153,301	4,368	287,636	.....	214,613	211,665	47,797
Vandalia.....	827	545,965	207,509	840,342	147,690	154,441	21,328	315,465	18,864	657,788	.....	182,554	153,867	4,996
Vicksburg, Shreveport & Pacific.....	171	61,162	30,953	104,144	10,880	15,055	3,263	36,118	5,051	70,367	.....	33,777	26,835	25,811
Virginia & Southwestern.....	240	135,574	13,852	153,155	15,980	33,189	1,901	40,499	3,651	95,220	.....	57,935	52,604	4,368
West Jersey & Seashore.....	356 ³⁸	164,454	412,376	610,073	77,688	77,217	14,753	220,058	15,326	405,042	.....	205,031	170,536	20,839
TWELVE MONTHS OF FISCAL YEAR, 1912.														
Alabama & Vicksburg.....	143	\$1,013,974	\$473,553	\$1,605,190	\$240,607	\$319,954	\$45,593	\$573,972	\$62,081	\$1,242,207	.....	\$362,983	\$293,973	—\$124,375
Atchafalaya, Topeka & Santa Fe.....	8,201 ¹	58,916,752	23,345,373	89,856,347	13,347,319	13,631,675	2,005,716	26,764,618	1,916,988	57,666,316	.....	3,556,070	28,633,961	—960,765
Atlantic Coast Line.....	4,560 ²	22,452,360	8,407,624	33,463,558	4,273,545	5,038,547	566,317	11,752,552	910,622	22,541,583	.....	1,399,395	9,522,580	—372,083
Baltimore & Ohio—System.....	4,455 ³	72,465,544	14,754,912	92,594,323	11,365,454	16,651,534	1,950,599	32,751,235	1,990,716	64,709,538	.....	2,984,948	24,233,197	1,598,822
Baltimore & Ohio Chicago Terminal.....	77	.....	27,929	1,557,470	264,693	211,151	10,276	721,693	55,684	1,263,495	.....	226,633	77,631	63,456
Bessemer & Lake Erie.....	204	8,000,695	340,577	8,457,266	783,658	1,550,994	105,302	2,105,550	123,249	4,668,753	.....	3,788,513	3,667,039	1,085,941
Buffalo, Rochester & Pittsburgh.....	570 ⁴	8,174,728	1,038,260	9,542,368	1,195,263	1,807,076	120,109	3,137,300	204,481	6,464,229	.....	3,078,139	2,874,147	99,590
Butte, Anaconda & Pacific.....	46	977,632	104,149	1,152,879	162,568	218,991	8,744	159,898	35,293	945,494	.....	207,385	181,621	—15,800
Canadian Pacific Lines in Maine.....	233	905,600	360,581	1,357,208	303,275	303,275	63,927	734,413	55,516	1,362,382	.....	107,300	112,474	—93,759
Charleston & Western Carolina.....	341	1,473,671	360,581	1,933,896	361,057	299,335	37,347	751,518	58,649	1,507,906	.....	425,990	360,075	—209,720
Chicago & Alton.....	1,025	9,311,818	4,104,741	14,535,722	1,894,536	2,696,132	477,994	5,428,690	387,848	10,885,200	.....	3,650,322	3,154,294	—542,606
Chicago & Eastern Illinois.....	1,275	11,138,149	2,900,522	15,215,513	1,462,391	2,778,230	362,549	5,810,823	485,759	10,899,752	.....	4,315,761	3,857,758	—458,000
Chicago & Northwestern.....	7,960 ⁵	46,691,540	19,553,567	73,698,592	9,368,721	13,959,853	1,340,086	30,924,748	1,498,245	52,701,844	.....	2,906,748	17,540,872	—1,194,893
Chicago, Indiana & Southern.....	359 ⁶	3,529,634	295,184	3,975,536	559,509	964,678	90,540	1,458,534	101,596	3,174,857	.....	153,099	651,270	187,878
Chicago, Indianapolis & Louisville.....	617	4,257,162	1,646,209	6,503,653	904,879	953,342	210,467	5,229,917	176,802	4,775,212	.....	2,529,441	1,450,296	—210,974
Chicago, Milwaukee & Puget Sound.....	2,059 ⁷	12,980,492	2,631,901	16,132,612	1,914,892	2,794,258	552,506	5,722,917	247,455	9,512,028	.....	6,220,584	5,679,445	—542,606
Chicago, Milwaukee & St. Paul.....	7,511	42,815,573	13,936,963	63,122,743	8,812,314	9,681,271	1,266,136	26,842,051	1,141,384	47,743,156	.....	15,379,587	12,532,345	—2,922,900
Chicago, Rock Island & Gulf.....	4,778	2,025,251	615,988	2,841,460	323,834	277,082	122,235	1,051,704	98,622	1,873,477	.....	967,983	880,080	—58,416
Chicago, Rock Island & Pacific.....	7,566 ⁸	39,131,584	17,993,420	61,871,353	8,169,512	8,025,384	1,859,164	25,158,791	1,673,159	44,886,017	.....	16,983,376	14,123,442	—2,862,935
Chicago, St. Paul, Minneapolis & Omaha.....	1,748 ⁹	9,478,792	4,551,594	14,513,426	1,684,548	1,796,694	320,889	6,283,448	380,637	10,466,216	.....	4,669,210	3,881,631	—811,821
Chicago, Terre Haute & Southeastern.....	351	1,579,586	204,145	1,827,361	269,944	309,255	35,926	590,557	89,394	1,295,076	.....	532,285	425,945	—106,340
Cincinnati Northern.....	245 ¹⁰	1,048,372	213,409	1,324,747	247,765	285,723	32,566	567,367	37,675	1,171,596	.....	153,151	86,260	—66,891
Cleveland, Cincinnati, Chic. & St. Louis.....	2,012 ¹¹	20,370,626	7,693,709	30,700,844	3,555,982	5,172,076	908,299	12,439,596	662,551	22,738,504	.....	7,962,340	6,759,859	1,206,080
Colorado Midland.....	338	401,302	267,142	1,830,166	248,665	338,802	88,760	813,721	65,017	1,554,965	.....	275,201	176,897	29,426
Cummers Valley.....	162	2,235,362	658,654	3,034,351	527,521	397,326	54,357	983,423	93,601	2,058,228	.....	978,123	701,161	—277,067
Delaware & Hudson Co.—R. R. Dept.....	854 ¹²	17,578,005	2,979,235	21,242,929	1,661,762	2,978,844	272,001	7,487,106	567,237	12,966,950	.....	8,275,979	7,713,431	—8,298
Denver & Rio Grande.....	2,556 ¹³	17,359,374	4,888,588	23,280,403	3,201,865	4,326,860	634,297	8,185,484	636,012	16,984,518	.....	6,293,885	5,396,260	—1,150,553
Denver, Northwestern & Pacific.....	215	854,148	290,945	1,197,597	183,161	196,331	32,021	433,973	56,501	901,987	.....	295,610	41,220	—22,063
Detroit & Mackinac.....	358 ¹⁴	837,936	330,467	1,243,015	200,363	216,978	29,504	409,844	36,879	893,568	.....	349,447	245,473	—7,271
Detroit, Toledo & Ironton.....	441	1,475,931	160,194	1,762,327	336,358	232,043	32,466	866,224	109,564	1,576,655	.....	185,672	120,213	—169,089
Duluth & Iron Range.....	274 ¹⁵	6,320,178	254,009	6,684,437	925,160	613,194	12,188	1,361,866	130,493	3,042,901	.....	3,641,536	3,444,062	—533,676
Duluth, Missabe & Northern.....	351 ¹⁶	6,900,528	447,200	7,443,707	1,060,999	798,650	22,588	1,372,148	155,994	3,410,379	.....	4,323,328	4,244,441	—88,887
Duluth, South Shore & Atlantic.....	623 ¹⁷	2,061,096	929,692	3,152,475	575,766	360,164	121,764	1,225,429	112,038	2,395,161	.....	757,314	543,255	—130,471
El Paso & Southwestern Co.....	902	6,267,290	971,461	7,613,456	906,737	1,045,766	149,029	2,121,993	275,891	4,499,416	.....	3,114,040	2,777,874	—144,548
Elgin, Joliet & Eastern.....	841 ¹⁸	10,083,626	109	10,720,751	993,406	1,840,565	52,078	3,094,427	190,765	6,171,241	.....	4,549,510	4,294,151	—1,747,297
Florida East Coast.....	630 ¹⁹	2,098,830	1,749,974	4,432,304	695,836	588,595	83,775	1,618,491	130,384	3,117,081	.....	1,315,223	1,123,294	—280,633
Grand Rapids & Indiana.....	586 ²⁰	3,081,690	1,709,019	5,182,223	601,728	882,930	135,968	2,233,928	179,565	4,034,119	.....	1,438,104	1,478,884	—44,764
Indiana Harbor & Belt.....	105 ²¹	2,626,988	346,360	3,145,252	317,142	295,124	33,152	1,186,858	85,985	1,918,261	.....	708,722	683,267	304,587
Kanawha & Michigan.....	177 ²²	2,732,888	.....	.....	405,947	570,346	27,675	928,427	81,163	2,013,560	.....	1,131,692	1,027,061	—91,968
Kansas City Southern.....	827	6,658,269	1,599,346	9,272,859	1,041,393	1,289,937	316,575	3,318,608	366,326	6,332,839	.....	2,940,020	.....	—699,646
Lake Erie & Western.....	886	4,350,465	890,639	5,550,214	801,085	1,003,13,								

REVENUES AND EXPENSES OF RAILWAYS.

TWELVE MONTHS OF FISCAL YEAR, 1912—(CONTINUED).

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses			Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decrease) last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance of way and structures.	Equipment.	Traffic.	Trans- portation.				
New Orleans & North Eastern.....	196	\$2,861,932	\$627,251	\$3,489,183	\$365,274	\$701,357	\$113,574	\$1,458,047	\$987,420	\$109,184	\$870,202	—\$138,038
New York Central & Hudson River....	3,597 ²⁹	61,262,432	32,080,521	93,342,953	17,746,393	17,746,393	2,274,574	26,080,461	28,516,918	5,909,322	22,870,325	1,951,732
New York, Philadelphia & Norfolk.....	112	2,714,139	450,088	3,164,227	3,424,154	331,437	48,139	1,372,009	928,647	93,281	835,366	44,095
Norfolk & Western.....	2,018 ³⁰	34,022,572	4,342,452	38,365,024	4,816,378	7,676,464	639,936	11,771,800	14,065,807	1,410,000	12,655,398	1,366,135
Norfolk Southern.....	608	2,189,600	844,251	3,033,851	3,284,824	394,142	66,808	1,062,837	1,205,500	90,034	1,106,671	53,953
Norfolk Central.....	473 ³¹	9,464,273	2,309,261	11,773,534	1,456,069	2,691,747	182,156	6,279,900	1,636,730	459,071	1,183,386	—249,597
Pecos & Northern Texas.....	470 ³²	1,553,193	414,423	1,967,616	282,865	424,240	31,855	744,725	515,170	56,467	458,703	34,941
Pennsylvania Co.....	1,760 ³³	41,206,703	8,915,196	50,121,899	7,572,917	9,861,581	930,886	19,446,252	16,070,090	2,389,030	13,680,903	—220,906
Pennsylvania Railroad.....	4,021 ³⁴	19,005,819	54,247,664	73,253,483	18,619,833	32,650,326	2,271,060	60,377,545	46,093,551	7,021,031	37,621,388	793,211
Peoria & Eastern.....	352	2,225,413	705,218	2,930,631	422,282	471,871	60,922	1,331,545	804,776	117,003	687,773	26,984
Philadelphia, Baltimore & Washington..	713	9,422,943	7,853,720	17,276,663	2,713,212	3,335,657	340,614	8,131,946	4,290,624	599,794	3,690,830	—169,005
Pittsburgh & Lake Erie.....	215	14,385,903	1,525,102	15,911,005	1,774,969	2,616,372	154,347	3,903,006	7,706,211	7,335,488	363,389	—266,798
Pittsburgh, Cincinnati, Chic. & St. Louis	1,468 ³⁵	28,329,866	7,993,744	36,323,610	5,320,316	7,662,881	815,782	1,821,504	11,323,176	1,522,473	9,990,598	544,790
Rutland.....	468	1,881,125	1,106,885	2,988,010	404,458	623,579	87,299	1,371,348	2,567,000	135,820	2,737,350	35,343
St. Louis Merchants' Bridge Terminal...	9	3,805	1,767,954	1,771,759	285,315	101,477	5,469	965,146	346,334	68,932	277,402	—43,643
San Antonio & Aransas Pass.....	727	3,175,353	1,190,368	4,365,721	823,139	608,967	69,948	1,776,274	1,213,895	144,032	1,069,863	218,590
Southern.....	7,090 ³⁶	41,508,300	16,939,811	58,448,111	7,841,220	10,108,673	1,745,353	22,081,653	19,894,093	2,452,328	17,506,519	343,242
Southern Kansas of Texas.....	125	1,134,274	1,391,579	2,525,853	169,889	291,013	24,503	509,654	348,727	31,023	317,704	—56,440
Syracuse, Binghamton & New York.....	81	637,699	400,208	1,037,907	146,748	105,101	34,504	445,383	418,225	78,240	339,985	—56,091
Texas & Pacific.....	1,885	11,807,964	4,092,246	15,900,210	2,165,311	2,580,395	376,704	7,636,061	549,825	728,070	2,888,619	30,498
Toledo & Ohio Central.....	441 ³⁷	4,364,211	630,515	4,994,726	831,160	825,760	76,967	1,839,748	1,572,995	247,454	1,316,250	14,524
Toledo, Peoria & Western.....	248	7,754,819	1,276,600	9,031,419	200,036	286,529	9,281	1,046,017	230,583	58,213	1,720,370	—27,568
Union R. R. of Pennsylvania.....	31	1,241,252	248,823	1,490,075	151,085	114,409	6,655	66,420	1,288,941	68,024	1,220,917	—32,950
Vandalia.....	827	6,496,963	2,418,727	8,915,690	1,413,938	991,135	1,220	1,568,613	1,410,475	72,323	1,376,759	571,412
Vicksburg, Shreveport & Pacific.....	171	784,200	441,725	1,225,925	255,471	249,031	38,613	446,749	306,980	340,090	1,734,502	—294,028
Virginia & Southwestern.....	240	1,553,620	162,520	1,716,140	212,341	362,599	22,283	500,663	615,201	80,612	223,963	—91,668
West Jersey & Seashore.....	356 ³⁸	1,908,025	4,049,436	5,957,461	964,513	1,044,713	161,098	2,703,560	1,335,075	320,253	972,556	152,760

Operated at end of previous period—²⁹ 3,591 ³⁰ 2,004; ³¹ 4,469; ³² 296; ³³ 1,416; ³⁴ 3,977; ³⁵ 1,468; ³⁶ 7,039; ³⁷ 444; ³⁸ 353. — Indicates Deficits, Losses and Decreases.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Henry B. Dike, general solicitor of the Minneapolis, St. Paul & Saulte Ste Marie, has been appointed assistant to the president, with office at Minneapolis.

J. E. Muhlfeld, vice-president and general manager of the Kansas City Southern, has resigned, and the affairs of that office will be taken care of by President J. A. Edson.

Theodore P. Shonts, president of the Toledo, St. Louis & Western, is to resign in the near future in order to give more time to his work on the Interborough Rapid Transit.

Operating Officers.

F. E. Foster has been appointed assistant superintendent of the Sonora division of the Southern Pacific of Mexico and of the Sonora Railway, with office at Empalme, Son., Mexico.

J. F. Irwin, superintendent of the Newark division of the Baltimore & Ohio, has been appointed general agent, operating department, in the Newark and Columbus territory, with office at Newark, Ohio.

C. S. Lake, superintendent of the New York, New Haven & Hartford at Waterbury, Conn., has been appointed general superintendent of the Minneapolis & St. Louis, with office at Minneapolis, Minn.

William Lamb, yardmaster of the Illinois Central at Clinton, Ill., has been appointed trainmaster of the Clinton, Havana and Decatur districts of that road, with office at Clinton, succeeding Harry J. Swarts, assigned to other duties.

Louis Mims, assistant superintendent of the Louisiana Western and Morgan's Louisiana & Texas Railroad & Steamship Company at Lafayette, La., has been appointed superintendent of those roads, with office at Lafayette, succeeding E. E. Shackford, resigned.

J. W. Farrell, who has been on leave of absence, has resumed his duties as trainmaster of the Second district of the Eastern division of the Grand Trunk, with office at Island Pond, Vt., and E. S. Cooper, who has been acting trainmaster of both the First and Second districts, has been appointed trainmaster of the First district, with office at Island Pond.

G. A. Codling, car accountant of the Lake Shore & Michigan Southern, Lake Erie & Western and subsidiary lines, has been appointed superintendent of car service of their lines, with office at Cleveland, succeeding O. C. Smith, resigned to accept service with another company. William Bartley succeeds Mr. Codling, with office at Cleveland.

J. V. Kennedy, superintendent of terminals of the Cleveland, Cincinnati, Chicago & St. Louis at Cincinnati, Ohio, has been appointed superintendent of the Cincinnati Northern, with office at Van Wert, Ohio, succeeding W. T. Backus, retired on account of illness. B. C. Byers, trainmaster of the C. C. & St. L. at Kankakee, Ill., succeeds Mr. Kennedy. J. A. Morris succeeds Mr. Byers.

E. H. Holden, superintendent of the Kansas City Southern, at Texarkana, Tex., has been appointed general superintendent of transportation, with headquarters at Kansas City, Mo., and his authority extends over all matters pertaining to the transportation department, including all train, yard and station service and the distribution and use of locomotives and cars, and J. E. Fairhead has been appointed superintendent of car service, with office at Kansas City. R. R. Sutherland, at Shreveport, La., has been appointed superintendent of the Southern division, and of the Texarkana & Fort Smith, with headquarters at Texarkana.

Michael H. Cahill, whose appointment as superintendent of the Newark division of the Baltimore & Ohio, with headquarters at Newark, Ohio, has been announced in these columns, was born on November 19, 1872, and began railway work in November, 1887, as a telegraph operator at Lexington, Ohio,

on the New Castle division of the Baltimore & Ohio. In October, 1892, he was promoted to train despatcher at Akron, and in February, 1905, he was appointed division operator at that place of the same company. He was promoted to trainmaster of the Pittsburgh division on May 1, 1910, and two years later was made assistant superintendent of the same division, which position he held at the time of his recent appointment as superintendent of the Newark division, as above noted.

Frederick Edgar Bolte, whose appointment as superintendent of transportation of the Wabash Railroad, with office at St. Louis, Mo., has been announced in these columns, was born September 2, 1874, at Duquoin, Ill. He received a high school education at Belleville, Ill., and began railway work October 29, 1889, as a telegraph operator on the Illinois & St. Louis, now part of the Southern Railway. He was with that company until November, 1891, having been copier in the despatcher's office for a time, and later chief clerk to the superintendent. In 1891 he went with the Terminal Railroad Association of St. Louis in the telegraph and interlocking department, and in 1897 was promoted to chief train director in the St. Louis union station interlocking tower. Mr. Bolte was made passenger trainmaster of the same company in 1904, which position he resigned July 22, 1912, to become superintendent of transportation of the Wabash.

J. M. Oxley, superintendent of the Chicago, Milwaukee & St. Paul at Des Moines, Iowa, has been appointed superintendent of the Chicago division, with office at Chicago, succeeding L. R. Clausen, resigned to engage in other business. R. P. Edson, assistant superintendent at Mitchell, S. D., has been appointed superintendent of the Des Moines division, succeeding Mr. Oxley. W. B. Hinrichs, trainmaster at Milwaukee, Wis., has been made superintendent of the Milwaukee terminals, succeeding B. H. McNaney, transferred. C. A. Anderson, chief train despatcher west of Sanborn, Iowa, has been appointed assistant superintendent of the Iowa and Dakota division, west of Sanborn, succeeding Mr. Edson. M. C. Corbett succeeds Mr. Anderson. C. E. Corcoran has been appointed chief train despatcher in place of Andrew Esse, whose appointment as trainmaster of the Sioux City and Dakota division, has been announced in these columns.

Frederick Winfield Scott, whose appointment as superintendent of the Georgia, Southern & Florida, with headquarters at Macon, Ga., has been announced in these columns, was born on May 28, 1868, at Salem, Ala. He began railway work in February, 1886, on the Central of Georgia, as an operator, and was later agent and operator of the same company. He was then promoted to clerk, and from March, 1887, to July of the following year was operator in the trainmaster's office at Macon, Ga. He was then for one year operator and car clerk at Birmingham, Ala., of the same company, and in July, 1889, was promoted to extra despatcher. The following March he was appointed traveling auditor, and in June, 1890, he left the service of the Central of Georgia, to go to the Georgia Southern & Florida as despatcher. He was promoted to chief despatcher about five years later, and in April, 1903, was made master of trains, which position he held at the time of his recent appointment as superintendent of the same company, as above noted.

G. M. Lindsay, manager of mail traffic of the Missouri, Kansas & Texas, having resigned, all matters pertaining to the mail service have been placed under the jurisdiction of W. A. Durham, assistant general manager, with office at St. Louis, Mo. O. C. Smith, superintendent of car service of the Lake Shore & Michigan Southern and the Lake Erie & Western at Cleveland, Ohio, has been appointed superintendent of transportation of the Missouri, Kansas & Texas, the Missouri, Kansas & Texas of Texas and the Texas Central, with office at Denison, Tex., succeeding A. E. Boughner. Incident to recent changes in the operating organization of the Missouri, Kansas & Texas, Mr. Boughner has been appointed superintendent of the St. Louis district, embracing the St. Louis, Boonville, Hannibal and Holden divisions and Columbia branch; and W. Wackher, assistant superintendent at Parsons, Kan., has been appointed trainmaster of the St. Louis district, both with office at Sedalia, Mo. J. L. Walsh, superintendent at Sedalia, has been appointed superintendent of the Parsons district, embracing the Sedalia, Kansas City and

Neosho divisions, Iola and El Dorado branches and Parsons terminal; and K. A. Easley, superintendent at Parsons, and S. H. Charles have been appointed trainmasters of the Parsons district, all with office at Parsons. J. F. Hickey, superintendent at McAlester, Okla., has been appointed superintendent of the McAlester district, embracing the Cherokee, Joplin, Tulsa, Muskogee, Choctaw and Wilburton divisions and Coalgate branch; and R. R. Farmer, assistant superintendent at McAlester, has been appointed trainmaster of the McAlester district, both with office at McAlester. F. P. Stocker, assistant superintendent at Parsons, has been appointed trainmaster of the McAlester district, with office at Parsons. W. E. Brown, superintendent at Oklahoma City, Okla., has been appointed superintendent of the Oklahoma district, embracing the Osage, Oklahoma, Shawnee and Guthrie divisions, and T. E. Gardner, assistant superintendent at Oklahoma City, has been appointed trainmaster of the same district, both with office at Oklahoma City.

William R. Scott, whose appointment as general manager of the Southern Pacific Company, Pacific system, with office at San Francisco, Cal., has been announced in these columns, was



W. R. Scott.

born on November 8, 1860, and was educated in the common schools. He began railway work in 1881 with the Atchison, Topeka & Santa Fe, where he was consecutively locomotive fireman until July, 1884, locomotive engineer during the next seven years, and traveling engineer from July, 1891, to August, 1898. He then went with the Gulf, Colorado & Santa Fe, where he was trainmaster of the Northern division for two years, and division superintendent at Cleburne, Tex., from June, 1900, to March 1, 1901. On the latter date he was made general superintendent of the Fort

Worth & Denver City, where he remained for more than two years. Mr. Scott went to the Southern Pacific in September, 1903, as assistant superintendent of the Sacramento division. Two months later he was appointed superintendent of the Salt Lake division, and he was transferred to the Western division in June, 1905. He was promoted to general superintendent in September, 1907, to assistant general manager two months later, and on July, 15, 1912, he was made general manager, as above noted.

Traffic Officers.

E. C. Kannapell has been appointed traveling freight agent of the Southern Railway, with office at Louisville, Ky.

R. E. Bennett has been appointed assistant commercial agent of the Texas-Mexican Railway, with office at Corpus Christi, Tex.

H. A. Stuart has been appointed traveling freight and passenger agent of the Chicago Great Western, with office at Winnipeg, Man.

E. E. McConnell, acting commercial agent of the Central Dispatch (C. C. C. & St. L. division), has been appointed commercial agent, with office at St. Louis, Mo.

G. L. Cobb, southwestern passenger agent of the Chicago, Milwaukee & St. Paul at Kansas City, Mo., has been appointed general agent, with headquarters in New York City.

George R. French has been appointed traveling passenger agent of the Great Northern, with office at Boston, Mass., succeeding G. M. Grabell, who has been made city passenger agent at New York City, in place of Stephen Lounsberry, promoted.

M. A. Calhoun, traveling freight agent of the Seaboard Air Line, with office at Columbus, Ga., has been appointed commer-

cial agent, with office at Columbus, succeeding G. H. Whitaker, resigned to go with another company. L. F. Buttolph succeeds Mr. Calhoun, with office at Columbus.

J. J. Devereux has been appointed traveling agent in the freight and passenger department of the Atchison, Topeka & Santa Fe, with headquarters at Salt Lake City, Utah, succeeding E. R. Leis, promoted. W. J. Curtis, passenger agent at Topeka, Kan., has been appointed district passenger agent, with office at Topeka.

James P. Anderson, district passenger agent of the Pennsylvania Railroad, at Pittsburgh, Pa., has been appointed assistant general passenger agent, with office at Philadelphia, Pa. Bruce K. Wimer, freight solicitor at Philadelphia, has been appointed district freight solicitor, with office at Easton, Pa., succeeding W. J. Hickey, resigned to become district freight solicitor of the Long Island Railroad, with headquarters at Brooklyn, N. Y. J. E. Kirk succeeds Mr. Wimer, with office at Philadelphia, and W. W. Finley, Jr., has been appointed freight solicitor, with office at Baltimore, Md., succeeding A. L. Geyelin, promoted.

Frank Wisner Robinson, whose appointment as assistant to director of traffic of the Harriman Lines, with office at Chicago, has been announced in these columns, was born at Cherry-



F. W. Robinson.

He began railway work April 1, 1889, with the Union Pacific, where for more than ten years he was in the passenger and freight accounting departments. From September, 1899, to January 1, 1906, he was in the freight traffic department of the same road at Omaha, Neb., and for four years from the latter date he was chief clerk to the director of traffic at Chicago. He was appointed assistant general freight agent of the Oregon-Washington Railroad & Navigation Company at Portland, Ore., in January, 1910, and seven months later was made general freight

agent of the same company. He was made assistant to director of traffic of the Union Pacific system and the Southern Pacific Company, as above noted, on May 15, 1912.

Engineering and Rolling Stock Officers.

Robert Wallace has been appointed general road foreman of engines of the Cincinnati, Hamilton & Dayton, with office at Cincinnati, Ohio.

C. H. Dana, assistant engineer of the Gulf, Colorado & Santa Fe, at Galveston, Tex., has been appointed chief engineer of the Union Terminal Company, at Dallas.

F. Ringer, assistant chief engineer of the Missouri, Kansas & Texas at St. Louis, Mo., has been appointed engineer maintenance of way, with office at Parsons, Kan.

E. J. Boland, supervisor of the Illinois Central at Water Valley, Miss., has been appointed roadmaster of the Wisconsin division, with office at Freeport, Ill., succeeding J. H. Sheahan, granted leave of absence.

John W. Branton, general foreman of the Illinois Central at Mounds, Ill., has been appointed master mechanic of the Centralia district, with office at Centralia, Ill., succeeding R. H. Horn, assigned to other duties.

M. M. Cook, chief engineer of the Wichita Falls & Northwestern, the Wichita Falls & Northwestern of Texas, the Wichita Falls & Southern and the Wichita Falls & Wellington, with office at Wichita Falls, Tex., has resigned to become assistant engineer of the California railway commission.

Edward Gray, engineer maintenance of way of the Southern Railway, at St. Louis, Mo., has resigned, to become a member of the firm of Jones-Gray Construction Company, with headquarters at Winchester, Ky. This company has a contract to build a new line for the Louisville & Nashville in Kentucky.

Purchasing Officers.

M. J. Power has been appointed general storekeeper of the Canadian Pacific lines east of Fort William, Ont., with office at Montreal, Que., succeeding J. H. Callaghan, deceased.

OBITUARY.

Charles L. Ewing, until about two years ago general superintendent of the Illinois Central, with office at Chicago, died of heart disease at his home in Chicago on August 4.

Since the official opening of the Rosario to Puerto Belgrano railway, Argentina, in May, a regular passenger schedule has been in effect, giving two through trains a day in each direction between Rosario and Bahia Blanca. Freight is also moving. The opening of this line is of great significance, as it cuts directly across the previously established lines of traffic radiating from Buenos Aires and through the whole width of their territory.

Railway construction and consequent development of the regions traversed have been rather slow in Peru during late years. The North Western Railway of Peru being the only line that has actually been built. There are, however, good prospects of greater activity in this field in the near future. The concession for the Ucayali railway, to run from the present railway terminus to a navigable point on the Ucayali river, about 310 miles, has been granted, and the necessary financial arrangements for carrying it out are at present being perfected. The Huancayo-Ayacucho-Cuzco Railway, Peru, about 497 miles long, will connect the Central Railway with the Southern Railway, will pass through one of the richest mining districts in Peru, and probably in South America.

The new line between Ashmoun, Egypt, and the Barrage, with four stations, work upon which was begun in 1910, was opened for travel in July, 1911. This line opens up a section that had never possessed railway facilities of any kind. Considerable progress was made upon the line connecting Zifteh with Zagazig, which will be finished in another year and greatly shorten the distance by rail between the eastern and western halves of the Delta. A feature of the work upon this line is the construction of a steel bridge across the Nile at Zifteh and two more bridges across large irrigation canals. During the year a new double line swing bridge was completed at Rasswa, near Port Said, to carry the railway over the new canal which is being made to connect Lake Manzaleh with the Suez Canal.

Nicaragua is divided into two entirely separate sections, the Atlantic and the Pacific, which can never be united to their mutual benefit without the aid of railway communication. At present almost all products, as well as the majority of passengers, go from one part to the other by way of Panama or Costa Rica. The balance of the freight and passenger traffic is via Greytown and the San Juan river. Two railways are now proposed from the Atlantic coast to the interior; one from Rama and the other from La Cruz on the Rio Grande. Rama is 60 miles up the Escondido river, and in order to allow large steamers to go up the bar at Bluefields must be dredged and kept open. The same objection applies to La Cruz, about 85 miles up the Rio Grande, the bar of which is very shallow and shifting. It is said that the best plan would be to build a railway from Bragmans Bluff on the Atlantic coast to Matagalpa in the interior, through the principal mining districts. Bragmans Bluff is about 50 miles south of Cape Gracias a Dios, and forms a natural harbor, protected from the north winds, and with deep water for large vessels, under lee of the shore. The road would be easy to construct, as the land is high and level, and few large bridges would be necessary by running the road from the Bluff to Wawa, thence to the Okonwass and Pis Pis mining districts, and from there to Matagalpa.—*Consular Report.*

Equipment and Supplies.

LOCOMOTIVE BUILDING.

THE WABASH has been authorized to purchase 20 mikado locomotives.

THE VIRGINIAN has ordered 8 mikado locomotives from the Baldwin Locomotive Works.

THE MOBILE & OHIO has ordered 2 mikado locomotives from the Baldwin Locomotive Works.

THE RARITAN RIVER has ordered 1 consolidation locomotive from the Baldwin Locomotive Works.

THE GRAY LUMBER COMPANY has ordered 1 ten-wheel locomotive from the Baldwin Locomotive Works.

THE CENTRAL OF NEW JERSEY has ordered 5 ten-wheel locomotives from the Baldwin Locomotive Works.

THE GREAT NORTHERN has ordered 10 six-wheel switching locomotives from the Baldwin Locomotive Works.

THE ESCANABA & LAKE SUPERIOR has ordered 1 consolidation locomotive from the Baldwin Locomotive Works.

THE MISSOURI & NORTH ARKANSAS has ordered 2 mikado locomotives from the Baldwin Locomotive Works.

THE MINNEAPOLIS & ST. LOUIS has ordered 2 consolidation locomotives from the American Locomotive Company. These locomotives will be equipped with superheaters, will have 22½-in. x 30-in. cylinders, 60-in. driving wheels, and in working order will weigh 187,000 lbs.

THE CENTRAL RAILWAY OF BRAZIL has ordered 2 ten-wheel locomotives from the American Locomotive Company. The dimensions of the cylinders will be 21½ in. x 28 in.; the diameter of the driving wheels will be 68 in., and the total weight in working order will be 158,000 lbs.

THE NEW YORK CENTRAL LINES have ordered 50 mikado locomotives from the American Locomotive Company, and not from the Baldwin Locomotive Works, as mentioned in the *Railway Age Gazette* of July 19. These locomotives are for the New York Central & Hudson River. This company is now in the market for 40 mikado locomotives for the Lake Shore & Michigan Southern.

CAR BUILDING.

THE WABASH is in the market for 1,200 center sills.

THE ILLINOIS CENTRAL is in the market for 30 caboose cars.

THE AMERICAN COTTON OIL COMPANY, New York, is in the market for 100 center sills.

THE KANAWHA & MICHIGAN has ordered 5 passenger cars from the Pullman Company.

THE GRAND TRUNK has ordered 2,000 thirty-ton box cars from the Pressed Steel Car Company, and 50 tank cars from the American Car & Foundry Company.

THE CHICAGO, MILWAUKEE & ST. PAUL has ordered 500 refrigerator cars from the American Car & Foundry Company, and is in the market for 21 postal cars.

THE PITTSBURGH & LAKE ERIE has ordered 500 gondola cars from the Pressed Steel Car Company and 500 gondola cars from the Standard Steel Car Company.

THE BUFFALO, ROCHESTER & PITTSBURGH, mentioned in the *Railway Age Gazette* of July 26 as being in the market for 500 gondola cars, 500 box cars, 100 automobile cars and 100 refrigerator cars, is now in the market for 500 gondola cars, 450 box cars, 100 furniture cars, 100 refrigerator cars and 50 automobile cars.

IRON AND STEEL.

THE CUBAN CENTRAL has ordered 5,000 tons of rails from the United States Steel Corporation.

THE KANSAS CITY, MEXICO & ORIENT has ordered 13,500 tons of rails from the Pennsylvania Steel Company.

Supply Trade News.

Darwin R. James, Jr., has been made president of the Pyrene Manufacturing Company, New York, succeeding P. L. Wilbur, resigned. Edward A. Clapp has been made secretary of this company, succeeding Otto Kelsey, resigned.

B. N. Osburn has resigned his position as president of the Boss Nut Company, Chicago, to become president and treasurer of the Auto Refrigeration Company of the same city. J. T. Benedict, vice-president of the Boss company, has been made president, succeeding B. N. Osburn.

Dabney H. Maury has established an office as consulting engineer at 1137-8 Monadnock block, Chicago. He will make a specialty of reports on, and design and superintendence of, waterworks, sewerage, lighting and power plants; and also of appraisal and adjustment of rates of public utilities. Douglas A. Graham will be associated with him as principal assistant engineer.

The Westinghouse Machine Company, Pittsburgh, Pa., has sent out a circular explaining the use to which the funds, received through the recent sale of the stock of the Electric Properties Company, New York, have been put. This transaction was mentioned in the *Railway Age Gazette* of July 5, page 36. About \$1,627,500 of the Westinghouse Machine Company's three-year notes, due January 2, 1914, have been retired. The circular goes on to say that "in connection with this transaction, \$1,699,000 first and refunding mortgage bonds have been canceled by the trustees, greatly enhancing the security of the remainder of the bonds authorized. On July 1, 1912, the total funded liabilities, including the remaining \$4,605,500 three-year notes, were \$6,640,500, on which the annual interest charges were \$384,880. The average annual earnings for the last ten years were \$651,994."

In the *Railway Age Gazette* of July 26, page 150, a reference was made to a sale by the McKeen Motor Car Company, Omaha, Neb., of two motor cars to the Victorian State Railways, Australia. Included in this item was a statement that it was doubtful whether any more of these cars would be ordered, because the railway authorities had heard of some English steam cars which they might prefer. This statement was misleading, for it seemed to imply that it was doubtful if any of the Australian railways would buy any more McKeen cars, whereas, as was announced in the *Railway Age Gazette* of July 19, the McKeen company had already received an order from the Queensland government lines for five 200-h. p. narrow gauge motor cars to be delivered at Brisbane, January 1, 1913. This order for five cars was in addition to the order for two cars for the Victorian railways mentioned in the *Railway Age Gazette* of June 28 and July 26.

TRADE PUBLICATIONS.

GRAB BUCKET CRANES.—The Sprague Electric Works of the General Electric Company, New York, has published bulletin No. 902 on grab bucket cranes. This bulletin is fully illustrated, shows installations of these cranes and describes their operation and advantages.

TELEPHONE WIRE.—The Duplex Metals Company, Chester, Pa., has published a 45-page booklet entitled Copper Clad Steel for Telephone Service, giving a full description of the process, application and uses of copper clad steel in telephone service. The booklet is thorough and gives useful information.

PNEUMATIC DRILLS.—The Ingersoll-Rand Company, New York, has published form No. 8007 on Little David pneumatic drills. These drills are adapted in their various sizes for all ordinary work of the pneumatic drill, such as drilling, reaming, tapping, flue rolling and wood boring. The catalog is illustrated and shows these drills in section and at work. A table is included which gives the sizes and capacities.

AIR BRAKE EQUIPMENT.—The Westinghouse Air Brake Company, Pittsburgh, Pa., has published, in a booklet entitled Personal Letters, the eight letters which appeared in the advertising pages of the daily editions of the *Railway Age Gazette*, published in connection with the M. M. and M. C. B. conventions at Atlantic City last June. These letters give an interesting account of how the product of this company has developed.

Railway Construction.

New Incorporations, Surveys, Etc.

ATLANTA & CAROLINA INTERURBAN.—According to press reports, this company will soon announce its plans for building an electric line from Atlanta, Ga., east to Augusta, about 160 miles. The company has recently secured additional financial backing. Some construction work has been carried out on the section between Atlanta and Conyers. Dr. H. L. Wilson, Atlanta, is interested.

ATLANTA, BIRMINGHAM & ATLANTIC.—The United States District Court has authorized the receivers to issue \$5,000,000 certificates, and from the proceeds of this sale to spend \$621,340 for additions and betterments, and \$423,485 additional for improvements at Brunswick, Ga. The additions and betterments include 148 miles of ballast, costing \$370,000, widening fills costing \$50,000, the laying of 81 miles of 80-lb. rail to cost \$408,000, passing track to cost \$23,000, yard tracks at various places to cost \$28,000, station facilities to cost \$21,000, interlocking plant near Bessemer, Ala., to cost \$26,000, and industrial tracks to cost \$28,000.

CAMDEN & GULF.—An officer of this company writes that they propose to build a line from Carrington, N. Dak., south to Hutchinson, Kan., about 725 miles, and that the prospects of building this line are good, but that track has not as yet been laid. Contracts for grading will probably be let about October, 1912. C. Hildreth, Franklin, Neb., is interested.

COLUMBUS, URBANA & WESTERN (Electric).—Receiver's certificates for \$286,000 will be issued to secure funds for extending the line to Rathbone, Ohio. L. P. Stephens, president and general manager, Cincinnati, Ohio.

GRAND TRUNK PACIFIC.—An officer is quoted as saying that an agreement has been reached with the city officials of Moose Jaw, Sask., in regard to an entrance of the Grand Trunk Pacific into that place. The plans provide for building the Regina branch through the city of Moose Jaw from the southeast to the northwest, so that the line may be extended north in the future. The company expects to establish large terminals in Moose Jaw.

GREAT NORTHERN.—An officer writes that all the track has been laid on the line from Fargo, N. Dak., northwest to Surrey, 225 miles. The line is half ballasted, and a contract for all the buildings and all the work under way has been let. It is expected that the line will be put in operation October 1. A. H. Hogeland, chief engineer, St. Paul, Minn. (December 15, p. 1258.)

GREENSBORO NORTHERN & ATLANTIC.—An officer writes that this project is still in a preliminary stage. Surveys have been made from Greensboro, N. C., east and south through Burlington, Graham, and along Haw river south towards Fayetteville, crossing the Southern Railway, the Seaboard Air Line and the Norfolk Southern's proposed extension to Charlotte. Surveys have been made from a point on the northern end through the center of Alamance and Caswell counties, N. C., to Danville, Va., thence through the center of Pittsylvania and Campbell counties to Lynchburg, crossing the Virginian, the Norfolk & Western, and the Chesapeake & Ohio. The prospects of building the line are good. Maximum grades will be 1 per cent., maximum curvature 6 deg. T. O. Troy, president; Walter Washabaugh, chief engineer, Greensboro.

HENDERSON INTERURBAN.—A proposition has been submitted by Burns & Company, Chicago, to build from Henderson, Ky., south via Corydon and Poole to Providence, about 40 miles, also a line west and south via Smith Mills and Uniontown to Morganfield. L. J. Jackson, H. Taylor and C. T. W. Argue, all of Henderson, are interested.

KENTUCKY & TENNESSEE.—An officer writes that at present there is no prospect of building this road, which is projected from Barthell, Ky., north through Stearns, and Worley to Gamacraw. W. Griffith, chief engineer, Stearns.

MAINE CENTRAL.—An officer writes that second-track is being built between Gray, Maine, and New Gloucester, and that grades

are being reduced from one per cent. to 0.5 per cent. between New Gloucester and Danville Junction.

MASON CITY-OSAGE.—This company is planning to build a line from Mason City, Iowa, northeast through Plymouth Junction to Osage, about 25 miles. The Commercial Club, of Mason City, Iowa, is to raise \$30,000 as a bonus for the road, and the secretary of the club writes that the prospects of building are good. There will be two bridges, one over 500 ft. long. F. A. O'Connor, president, New Hampton, Iowa.

MICHIGAN CITY, LAKESIDE & ST. JOE (Electric).—An officer writes that the plans call for building from Michigan City, Ind., northeast via New Buffalo, Mich., Union Pier, Lakeside, Harbert, Sawyer, New Troy, Bridgman, Livingston, Stevensville, Hill Top and St. Joseph to Benton Harbor, about 40 miles. A contract has been given to William C. Ross, Chicago, and a large amount of grading has already been finished. The cut and fill work amounts to about 30,000 cu. yds. a mile. The maximum grades will be 1 per cent., with 65 ft. radius curves. There will be a 125-ft. steel bridge, and a 1,000-ft. trestle, also a power house, some car barns and shops. G. W. Marsh, president, Old Colony building, Chicago; G. H. Dodge, chief engineer, 105 West Monroe street, Chicago.

NEW YORK SUBWAYS.—The New York Public Service Commission, First district, will hold hearings on August 13 and 14 on the form of contract for four additional sections of the subways. Immediately after these hearings bids will be called for on these four sections. The sections are: Manhattan section No. 1-A of the Lexington Avenue subway under Church and Vesey streets to Park place and Broadway, Bronx section No. 1 of the Southern Boulevard and Westchester Avenue subway to Pelham Bay park, and two Brooklyn sections Nos. 1 and 2 of route No. 11-B of the Fourth Avenue subway.

NEW YORK, WESTCHESTER & BOSTON.—The extension of train service on this road is noted on another page under Traffic News.

PENNSYLVANIA RAILROAD.—An officer writes regarding the work being done between Tyrone, Pa., and Lockhaven on the Bald Eagle Valley branch, that in order to handle the Erie division tonnage, the Bald Eagle Valley branch of the Tyrone division is undergoing some necessary changes involving the revision of grades, extension of passing sidings, construction of lapsidings, and building a new line over four miles long from Mount Eagle to Howard Rolling Mill, which includes extensive changes to public roads. Several grade crossings will be eliminated. When these improvements are completed, it will be possible to haul 4,550 tons eastbound, as compared with 3,000 tons, the present loading. It is expected that the work will be finished early in 1913. Alexander C. Shand, chief engineer, Philadelphia, Pa.

PROVO & EASTERN UTAH.—This company, which was incorporated recently for \$10,000,000, as mentioned in these columns last week, is planning to build not only a railway line from Springville, Utah, east to Jensen, with eventually a further extension east to Steamboat Springs, Col., but also to build a dam on the Green river in Split Mountain canyon, to carry out an irrigation project to furnish water to a large region in eastern Utah and western Colorado. The incorporators of the Provo & Eastern Utah are F. W. Short, Chicago, who is vice-president and general manager; John T. Pope, formerly sheriff of Uintah county, president and treasurer; R. M. Pope, Ogden, Utah; and S. A. Maginnis, Ogden. One of the incorporators is quoted as saying that an offer of co-operation had been made to the Denver, Northwestern & Pacific, but that the offer was not accepted. (August 2, p. 229.)

RIO GRANDE VALLEY TRACTION.—Incorporated with \$300,000 capital, to build from El Paso, Tex., southeast to Socorro, about 15 miles. M. M. Phinney, Boston, Mass.; R. Neilson and D. Daly, Houston, Tex., are directors.

ROCK ISLAND, TEXICO, FARWELL & SOUTHERN.—J. J. Fry, of Michigan City, Ind., is, it is understood, at the head of a syndicate which has bought the charter and franchises of this company, which proposes to build a railway from Farwell, Tex., near the Texas-New Mexico line, southeast to a connection with the Texas & Pacific at either Midland, or Big Spring, about 190 miles. A second division is projected to run from a connection

with the Texas & Pacific to San Antonio, an additional 250 miles.

ST. LOUIS, BROWNSVILLE & MEXICO.—An officer writes that it is expected to build a great deal of additional sidings on this line in the near future. F. G. Jonah, chief engineer, St. Louis, Mo.

SAN LUIS VALLEY.—Incorporated in Colorado, with \$1,000,000, and headquarters at Denver, to build from a connection with the Denver & Rio Grande at Alamosa, Colo., northwest to Monte Vista, thence north via Center to Saguache, about 60 miles. J. M. Herbert, W. C. Uebele, Denver; W. S. Freeman, C. B. Munday and J. B. Wamsden, Joplin, Mo., are directors.

WABASH RAILROAD.—An officer writes that contracts have been let for building new second-track from Romulus, Mich., to Britton, 28 miles. A. O. Cunningham, chief engineer, St. Louis, Mo. (August 2, p. 229.)

RAILWAY STRUCTURES.

ASPINWALL, PA.—An officer of the Pennsylvania Railroad writes that this company is building a small freight house and platform at Aspinwall. The buildings are of brick and concrete, and were designed by the company's architect.

BATON ROUGE, LA.—An officer of the Southern Pacific writes regarding the reports that a new bridge is to be built over the Mississippi river, to connect Baton Rouge with Port Allen, that nothing definite has been decided in regard to this bridge.

DECATUR, ILL.—The Wabash has been authorized to issue receivers' certificates to the amount of \$500,000 for new locomotive shops at Decatur, which will eventually cost \$750,000. These will be made the main shops of the system.

DETROIT, MICH.—The Wabash has been authorized to issue receivers' certificates for terminal improvements at Detroit, costing \$400,000. The work will include a new freight house at Seventh street and a new yard at Oakwood, in addition to the new engine terminal at Delray previously authorized.

LOS ANGELES, CAL.—The Atchison, Topeka & Santa Fe Coast Lines are working on plans for a large new passenger station which, it is reported, will cost about \$1,000,000.

MASON CITY, IOWA.—See Mason City-Osage under Railway Construction.

MOOSE JAW, SASK.—See Grand Trunk Pacific under Railway Construction.

OGDENSBURG, N. Y.—The Grand Trunk has completed the purchase of two square miles in the town of Prescott, opposite Ogdensburg, on the St. Lawrence river, for a new terminal for the Montreal and Bellville division of the railway. The property has an 800-ft. frontage on the river, having convenient wharfage facilities. The present terminal of the division is at Brockville.

PHILADELPHIA, PA.—An officer of the Pennsylvania Railroad writes that contracts for the bridge improvement work in Philadelphia, mentioned in these columns last week, have been given to Eyre-Shoemaker, Inc., Philadelphia, for the extension of the bridge over the Schuylkill river and East and West Park drives, and to Reiter, Curtis & Hill, Philadelphia, for the bridges over Girard avenue, Lansdowne drive (Fairmount Park), and the Philadelphia & Reading. (August 2, p. 229.)

SCHUYLKILL HAVEN, PA.—An officer of the Philadelphia & Reading writes that the contract for the Mine Hill Crossing bridge at Schuylkill Haven has been awarded to the Brown-King Construction Company, Harrison building, Philadelphia, Pa. (August 2, p. 229.)

SPOKANE, WASH.—The Chicago, Milwaukee & Puget Sound is expected to award a contract soon for a new freight station to cost approximately \$250,000, for which the excavation work is now in progress.

WICHITA, KAN.—A contract has been let to the Deiter & Wenzel Construction Company, Wichita, Kan., for the construction of a new union passenger station to cost approximately \$300,000. This work is being done in connection with the elevation of tracks for a distance of 1¼ miles through the city. The Texas Building Company, Ft. Worth, Tex., has the contract for retaining walls and subways on this job.

Railway Financial News.

ATLANTA, BIRMINGHAM & ATLANTIC.—The United States District Court has authorized the receivers to issue \$5,000,000 receivers' certificates, of which \$3,250,000 are to retire outstanding receivers' certificates, \$521,675 to pay the principal and interest of equipment notes due up to and including July first, 1913, \$183,500 to reimburse the company for the retirement of equipment trust certificates made out of earnings, \$621,340 for additions and betterments (see Railway Construction), and \$423,485 for improvements at Brunswick, Ga. (See Railway Structures.)

BUFFALO, ROCHESTER & PITTSBURGH.—The directors have declared a semi-annual dividend of 3 per cent. on the \$10,500,000 common stock, comparing with 2½ per cent. paid in the first half of 1912 and semi-annually in 1911. This places the stock on a 6 per cent. annual basis, as compared with a 5 per cent. annual basis in 1911 and a 4 per cent. basis in 1910 and 1909.

CANADIAN PACIFIC.—See Esquimalt & Nanaimo.

ESQUIMALT & NANAIMO.—This company has asked the Canadian railway commission for permission to lease its road for 999 years to the Canadian Pacific.

GENESSEE & WYOMING.—The New York Public Service Commission has approved the lease by this company of the Halite & Northern, which has recently been completed and is now ready for operation. The Halite & Northern runs from Leicester, N. Y., to Retsof, a little over three miles.

GRAND TRUNK.—The *Commercial & Financial Chronicle* says that the purchase by the Grand Trunk interests of 30,000 acres of coal lands in Belmont county, Ohio, was actually made last April and has not been affected by the death of President Hays, as was reported.

GREENVILLE & KNOXVILLE.—The company has made a mortgage to secure \$460,000 first mortgage, 5 per cent. bonds of 1912-1942. The road runs from Greenville, S. C., to Riverview, 23 miles.

HALITE & NORTHERN.—See Genessee & Wyoming.

NORFOLK & WESTERN.—Of the two original issues totaling \$25,569,000 4 per cent. convertible bonds, \$11,369,000 bonds were converted into stock at par during the fiscal year ended June 30, 1912, in addition to previous conversions. Since June 30, \$394,000 additional bonds have been converted, leaving but \$5,522,000 of these two issues of bonds outstanding. There are \$13,300,000 20-year 4 per cent. convertible bonds outstanding, which were offered to stockholders last February and on which the second payment of 50 per cent. is due in September.

This company has bought a half interest in the Virginia-Carolina Railroad from President Minges, who built it and has been operating it. It is reported that the price paid was \$1,000,000. The Virginia-Carolina is about 51 miles long, running from Abingdon, Va., to Kennarock.

ST. LOUIS, ROCKY MOUNTAIN & PACIFIC.—An initial dividend of 1¼ per cent. has been declared, payable August 31, to holders of the \$1,000,000 5 per cent. non-cumulative preferred stock.

WABASH.—Judge McPherson at St. Louis has authorized the receivers to issue \$2,500,000 of receivers' certificates, mentioned in these columns last week, the proceeds to be used for the following improvements: New coal chutes, \$75,000; new water stations, \$55,000; new depot buildings, \$100,000; second track, \$470,000; Detroit terminal facilities, \$400,000; 20 mikado freight locomotives, \$400,000; new locomotive shops at Decatur, \$500,000; miscellaneous improvements, \$500,000.

The Santa Fe Railway, Argentina, has completed plans for the addition of 420 miles to the 1,020 miles now in operation. Material for the first 62 miles has already been contracted for. The remainder of the extension will not be constructed immediately.